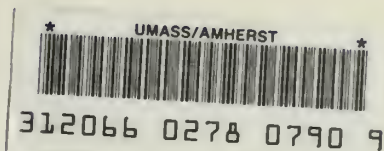




## South Corridor Bus Service Study



GOVERNMENT DOCUMENTS  
COLLECTION  
NOV 30 1990  
UNIVERSITY OF MASSACHUSETTS  
LIBRARY STAMP



Produced for the  
Massachusetts Bay  
Transportation Authority  
by the Central Transportation  
Planning Staff





---

# *South Corridor Bus Service Study*

---

## ***SOUTHBus***

### **Authors**

Geoff Slater - Project Manager  
Annette Demchur

### **Contributing Analysts**

Erik Holst-Roness  
Frannie Humplick  
Webb Sussman

### **Graphics**

Andrew Giammarco  
Jane Gillis  
David B. Lewis  
Carol Gautreau Wilson

The preparation of this document was supported by the Urban Mass Transportation Administration of the U.S. Department of Transportation through technical study grants MA-08-0144, MA-08-0115, and MA-08-0164, and by state and local matching funds.

### **Central Transportation Planning Staff**

Directed by the Boston Metropolitan Planning Organization, which comprises:

Executive Office of Transportation and Construction,  
Commonwealth of Massachusetts  
Massachusetts Bay Transportation Authority  
Massachusetts Bay Transportation Authority  
Advisory Board  
Massachusetts Department of Public Works  
Massachusetts Port Authority  
Metropolitan Area Planning Council

June 1990

## Abstract

---

This report summarizes the results of a detailed examination of thirteen local bus routes in the Boston neighborhoods of Dorchester, Hyde Park, Jamaica Plain, Mattapan, Roslindale, and West Roxbury, and in Brookline, Dedham, Norwood, Walpole, and Westwood. The study had four major objectives: (1) to ensure that service was as responsive to user needs as possible, (2) to identify changes that could attract new ridership, (3) to determine whether MBTA resources were being used as effectively as possible, and (4) to identify the ridership and performance characteristics of each route.

For each route, the report includes a description of the route, an assessment of the existing service, identification and evaluation of service alternatives, and conclusions and recommendations. Included in the recommendations are changes with respect to route alignments, service levels, schedules, and reliability, and other changes within the corridor that would affect ridership. The report also includes a market analysis that examined overall travel and development patterns within the corridor. This analysis determined which segments of the overall market are served by the existing routes, identified major trip attractors and generators not being served, and determined the implications of planned development for existing and future bus service.

**CENTRAL  
TRANSPORTATION  
PLANNING  
STAFF**

Ten Park Plaza, Suite 2150  
Boston, Mass 02116-3968



---

## Table of Contents

---

LIST OF FIGURES AND TABLES .....	ix
EXECUTIVE SUMMARY.....	E-1
1. INTRODUCTION.....	1
OVERVIEW .....	1
STUDY PROCESS.....	3
Data Collection .....	3
Market Analysis/Assessment of Existing Service .....	5
Identification and Evaluation of Alternatives for Improved Service .....	5
Conclusions/Recommendations .....	6
ORGANIZATION/ADDITIONAL INFORMATION .....	6
2. MARKET ANALYSIS.....	7
GENERAL STUDY AREA CHARACTERISTICS.....	7
Population/Employment.....	7
Socio-Economic Characteristics .....	8
EXISTING TRANSPORTATION USE/PATTERNS.....	10
COMMUNITY CONCERNS.....	16
LATENT DEMAND .....	18
IMPACT OF NEW DEVELOPMENT IN THE SOUTHBUS AREA.....	22
SUMMARY/OUTLOOK.....	30
3. MATTAPAN AND HYDE PARK SERVICE.....	33
4. ROUTE 24 (Wakefield Avenue/Truman Highway - Mattapan), ROUTE 27 (Mattapan - Ashmont), & ROUTE 33 (Dedham Line - Mattapan).....	37
ROUTE PROFILES .....	37
Route 24 .....	37
Route 27 .....	40
Route 33 .....	43
SERVICE COVERAGE .....	47
Overall Assessment of Routes .....	47
Extend Route 24 or Route 33 to Ashmont.....	51
Extend Both Routes 24 and 33 to Ashmont .....	53
Reroute Route 24 or Route 33 to Forest Hills via Route 32.....	55
Reroute Route 24 and Route 33 to Forest Hills via Route 50.....	60
Other Service Improvement Options .....	62
Relocation of Route 24's Outer End Layover Point.....	63
Operation of All Route 33.6 Trips as Route 33.5 .....	63

Simplification of Turnaround at Dedham End of Route 33 .....	65
Coordination of Route 24 and Route 33 Along River Street .....	65
LEVEL OF SERVICE .....	66
Route 24 .....	66
Route 27 .....	68
Route 33 .....	69
RELIABILITY .....	70
Route 24 .....	70
Route 27 .....	71
Route 33 .....	71
5. ROUTE 30 (Roslindale Square - Mattapan).....	73
ROUTE PROFILE.....	73
SERVICE COVERAGE .....	77
Overall Assessment.....	77
Extension of Route 30 to Forest Hills .....	78
Coordination of Route 30 with Route 27.....	81
LEVEL OF SERVICE .....	81
RELIABILITY .....	83
6. ROUTE 32 (Wolcott Square/Cleary Square - Forest Hills).....	85
ROUTE PROFILE.....	85
SERVICE COVERAGE .....	89
Overall Assessment.....	89
Improved Service to the Longwood Medical Area, the Back Bay, and Park Square .....	90
RELIABILITY .....	93
LEVEL OF SERVICE .....	97
7. ROUTE 34 (Walpole/Dedham Line - Forest Hills) .....	99
ROUTE PROFILE.....	99
SERVICE COVERAGE .....	109
Overall Assessment.....	109
Increase Service North of LaGrange Street .....	110
Reduction of Route Variations.....	111
Reduced Service to Walpole Center.....	112
Increased Service to the Dedham Mall .....	112
Replacement of Variation 34.5 PM Peak Trips with Variation 34.7.....	113
Extension of Variation 34.0 PM Peak Trips to the Dedham Mall .....	113
Provision of Park and Ride Service in the Route 128/Washington Street Area .....	114
Coordination of Route 34 Variations.....	115
Coordinate Walpole Center Service with Commuter Rail.....	116
RELIABILITY .....	117
LEVEL OF SERVICE .....	119
Recommended Level of Service Changes if	

Walpole Center Service Is Maintained.....	120
Recommended Level of Service Changes if Walpole Center Service Is Eliminated.....	123
<b>8. WEST ROXBURY AND ROSLINDALE SERVICE.....</b>	<b>127</b>
<b>9. ROUTE 35 (Dedham Mall/Dedham Line - Forest Hills) &amp; ROUTE 36 (Charles River Loop - Forest Hills) .....</b>	<b>131</b>
ROUTE PROFILES .....	131
Route 35 .....	131
Route 36 .....	135
SERVICE COVERAGE .....	139
Overall Assessment.....	139
Additional Evening Service on Route 35.....	140
Allocation of Service between Route 35 and Route 36.....	140
Coordination of Route 35 and Route 36 Service.....	142
Additional Service to the VA Hospital.....	144
Improved Coordination with Commuter Rail.....	145
LEVEL OF SERVICE .....	147
RELIABILITY .....	150
Route 35 .....	150
Route 36 .....	150
<b>10. ROUTE 37 (Baker/Vermont Streets - Forest Hills) .....</b>	<b>153</b>
ROUTE PROFILE.....	156
Overall Assessment.....	156
Realignment of Route 37 .....	157
Coordination of Route 37 with Routes 35 and 36.....	163
Improved Connections with Commuter Rail.....	165
LEVEL OF SERVICE .....	166
RELIABILITY .....	169
<b>11. ROUTE 38 (Wren Street - Forest Hills) &amp; ROUTE 51 (Cleveland Circle - Forest Hills).....</b>	<b>173</b>
ROUTE PROFILES .....	173
Route 38 Wren Street - Forest Hills.....	173
Route 51 Cleveland Circle - Forest Hills.....	176
SERVICE COVERAGE .....	180
Overall Assessment.....	180
Reroutings of Routes 38 and 51 to Provide Increased Local Service Coverage.....	183
Improved Service Coverage at Outer End of Route 38.....	187
Improved Connections with Commuter Rail.....	187
LEVEL OF SERVICE .....	188
Route 38 .....	188
Route 51 .....	190
RELIABILITY .....	190
Route 38 .....	190
Route 51 .....	191



12. ROUTE 40 (Georgetowne - Forest Hills).....	193
ROUTE PROFILE.....	193
SERVICE COVERAGE .....	196
OVERALL ASSESSMENT .....	196
Extension of Route 40 from Georgetowne to River Street .....	197
LEVEL OF SERVICE .....	200
Existing Service .....	200
With Extension around Reservation Loop.....	200
RELIABILITY .....	200
13. ROUTE 50 (Cleary Square - Forest Hills) .....	205
ROUTE PROFILE.....	205
SERVICE COVERAGE .....	208
LEVEL OF SERVICE .....	209
RELIABILITY .....	210
14. OTHER ISSUES.....	213
IMPROVED SERVICE BETWEEN WEST ROXBURY, HANCOCK VILLAGE AND CHESTNUT HILL.....	213
HOLDING OF BUSES AT FOREST HILLS UNTIL TRAINS HAVE UNLOADED .....	216
ADDITIONAL WEEKEND AND EVENING SERVICE .....	218
Additional Evening Service.....	221
Additional Sunday Service.....	222
Summary .....	223
15. SUMMARY/RECOMMENDATIONS .....	227
RECOMMENDED CHANGES.....	228
Route 24 (Wakefield Avenue/Truman Highway - Mattapan).....	229
Route 27 (Mattapan - Ashmont).....	229
Route 33 (Dedham Line - Mattapan) .....	229
Route 30 (Roslindale Square - Mattapan).....	236
Route 32 (Wolcott Square/Cleary Square - Forest Hills) .....	236
Route 34 (Walpole/Dedham Line - Forest Hills).....	237
Route 35 (Dedham Mall/Dedham Line - Forest Hills),.....	240
Route 36 (Charles River Loop - Forest Hills).....	240
Route 37 (Baker/Vermont Streets - Forest Hills).....	240
Route 38 (Wren Street - Forest Hills) .....	241
Route 40 (Georgetowne - Forest Hills) .....	243
Route 50 (Cleary Square - Forest Hills via Clarendon Hills).....	244
Route 51 (Cleveland Circle - Forest Hills) .....	244
OTHER ISSUES.....	245
Additional Evening and Weekend Service.....	245
Holding Buses at Forest Hills Until Trains Have Unloaded.....	245



---

**TECHNICAL SUPPLEMENT 1 (BOUND SEPARATELY)****A. ROUTE INFORMATION**

1. Route Listing
2. Route Maps
3. Spring 1988 Schedules
4. Stoplists

**B. RIDERSHIP, SERVICE, AND PERFORMANCE DATA**

1. Ridership, Service, and Performance Statistics
    - Summaries of Ridership and Performance Statistics
    - Ridership and Service Statistics by Time Period
  2. Trip Summaries
  3. Load Profiles
- 

**TECHNICAL SUPPLEMENT 2 (BOUND SEPARATELY)****C. FINANCIAL STATISTICS**

1. Annual Operating Cost and Revenue Statistics
2. Weekday Operating Cost and Revenue Statistics
3. Weekday Fare Revenue by Fare Type
4. Saturday Operating Cost and Revenue Statistics
5. Sunday Operating Cost and Revenue Statistics

**D. SURVEY RESULTS**

1. Summary of Survey Results
2. Access/Egress Mode Cross-Tabulations
3. Survey Form

**E. SCHEDULE STATISTICS**

1. Weekday Schedule Statistics
2. Comparison of Observed Running Times to MBTA Book Times
3. Current MBTA Book Times Compared to Estimated Book Times

**F. 1980 U.S. CENSUS JOURNEY-TO-WORK DATA**

1. Population and Employment Characteristics of the SOUTHBus Area
2. 1980 Journey-to-Work Trips between SOUTHBus Subareas, and to and from Downtown Boston
3. 1980 Journey-to Work Trips between Areas Directly Served by Individual Routes



---

## List of Figures and Tables

---

### Figures

1-1	Map of SOUTHBus Routes.....	2
2-1	SOUTHBus Area Work Trip Patterns.....	13
2-2	Areas within One-Quarter Mile of SOUTHBus Routes.....	21
3-1	Options for Improving Service from Mattapan and Hyde Park to Downtown Boston.....	34
4-1	Map of Route 24 (Wakefield Ave./Truman Hwy - Mattapan).....	38
4-2	Map of Route 27 (Mattapan - Ashmont).....	41
4-3	Map of Route 33 (Dedham Line - Mattapan) .....	44
4-4	Options for Improving Service from the Outer Ends of Route 24 and 27 to Downtown Boston.....	49
4-5	Routing of Route 33.5 and 33.6 Variations.....	64
4-6	Simplified Turnaround at Outer End of Route 33 .....	66
5-1	Map of Route 30 (Roslindale Square - Mattapan).....	74
6-1	Map of Route 32 (Wolcott Square/Cleary Square - Forest Hills).....	86
6-2	Route 32 Extension to Brigham Circle.....	91
7-1	Map of Route 34 (Walpole Center - Forest Hills).....	100
7-2	Route 34 Variations.....	102
7-3	Route 34 Service by Time Period.....	104
7-4	Route 34 Sample Inbound AM Peak Schedule .....	124
7-5	Route 34 Revised Inbound School Schedule.....	125
8-1	West Roxbury Alternatives.....	130
9-1	Map of Route 35 (Dedham Mall - Forest Hills) .....	132
9-2	Map of Route 36 (Charles River Loop/Dedham Line - Forest Hills)....	136
10-1	Map of Route 37 (Baker/Vermont Streets - Forest Hills).....	154
10-2	Realignment of Route 37 via Bellevue.....	158
10-3	Relocation of Route 37's Outer End to Reduce Cycle Times.....	164

11-1	Map of Route 38 (Wren Street - Forest Hills) .....	174
11-2	Map of Route 51 (Cleveland Circle - Forest Hills) .....	177
11-3	Route 38X and 51X Alternatives.....	181
11-4	Route 38 Outer End Extension.....	182
12-1	Map of Route 40 (Georgetowne - Forest Hills) .....	194
12-2	Extension of Route 40 past Georgetowne .....	198
13-1	Map of Route 50 (Cleary Square - Forest Hills).....	206
14-1	West Roxbury Centre Street Business District - Chestnut Hill Alternatives.....	214
14-2	Routes with Evening Service until 10:00 pm or Later.....	219
14-3	Routes with Sunday Service .....	220
14-4	Recommended Evening and Sunday Service.....	225
15-1	Route 38 Outer End Extension.....	242
15-2	Extension of Route 40 past Georgetowne .....	243
15-3	Recommended Route Structure.....	249

## Tables

2-1	Socio-Economic Characteristics of SOUTHBus Riders.....	10
2-2	Distribution of Work Trip Locations for Study Area Residents.....	11
2-3	Bus, Rapid Transit, and Commuter Rail Ridership from the SOUTHBus Corridor.....	14
2-4	Ridership Increases on SOUTHBus Routes to and from Forest Hills – Spring 1986 to Fall 1987 .....	15
2-5	Transfer Characteristics of SOUTHBus Riders.....	16
2-6	Service to Consider for Coordinated Scheduling .....	20
2-7	Transit Connections between Major Work Trip Interchanges.....	23
4-1	Route 24 Weekday Service Statistics .....	39
4-2	Route 24 Weekday Ridership and Productivity Statistics.....	39
4-3	Route 27 Weekday Service Statistics .....	42
4-4	Route 27 Weekday Ridership and Productivity Statistics.....	42
4-5	Route 33 Weekday Service Statistics .....	45
4-6	Route 33 Weekday Ridership and Productivity Statistics.....	46
4-7	Work Trips from Areas Served by Routes 24 and 33.....	47
4-8	Alternatives 1 and 2: Benefits to Existing Riders.....	51
4-9	Route 24/27 Combination – Schedule Statistics .....	52
4-10	Alternative 3 Schedule Statistics.....	54
4-11	Alternative 3 Headways Compared to Existing Headways.....	55
4-12	Alternative 3: Summary of Weekday Impacts.....	56
4-13	Alternative 4 and 5 Headways .....	57



4-14	Alternatives 4 and 5: Summary of Ridership Impacts .....	59
4-15	Alternatives 4 and 5: Cost and Service Impacts .....	60
4-16	Alternative 6 and 7 Headways .....	61
4-17	Alternatives 6 and 7: Summary of Ridership Impacts .....	62
4-18	Alternatives 6 and 7: Cost and Service Impacts .....	63
4-19	Route 33.5 and 33.6 Schedule Statistics .....	69
4-20	Route 24.0 Schedule Statistics .....	71
5-1	Route 30 Weekday Service Statistics .....	73
5-2	Route 30 Weekday Ridership and Productivity Statistics.....	75
5-3	Route 30 – Weekday Transfers with Other Routes.....	76
5-4	Weekday Work Trips from Areas Served by Route 30 .....	77
5-5	Travel Times to Downtown Boston from Route 30's Service Area.....	79
5-6	Route 30 Extension to Forest Hills – Schedule Statistics.....	80
5-7	Impacts of Headway Increases on Route 30.....	82
6-1	Route 32 Service Changes – Spring 1986 vs. Fall 1987.....	87
6-2	Route 32 Weekday Service Statistics .....	87
6-3	Route 32 Weekday Ridership and Productivity Statistics.....	88
6-4	Impacts of Route 32 Extension.....	92
6-5	Route 32.0 Schedule Statistics: Scheduled vs. Observed .....	94
6-6	Route 32.1 Schedule Statistics: Scheduled vs. Observed .....	95
6-7	Route 32: Revised Schedule Statistics .....	96
7-1	Route 34 Weekday Service Statistics .....	101
7-2	Route 34 Weekday Ridership and Productivity Statistics.....	107
7-3	Home, Work, and School Locations of Route 34 Riders.....	108
7-4	Impacts of Replacing Limited Service (34.3 and 34.5) with Non-Limited Service (34.4).....	111
7-5	Comparison of Alternatives for Increasing Service to the Dedham Mall.....	114
7-6	Schedule Changes Required to Coordinate Route 34 with Commuter Rail at Walpole Center.....	116
7-7	Route 34.0 Schedule Statistics .....	118
7-8	Route 34: Recommended Schedule Changes .....	119
7-9	Route 34: Summary of Recommended Level of Service Changes .....	121
9-1	Route 35 Weekday Service Statistics .....	133
9-2	Route 35 Weekday Ridership and Productivity Statistics.....	133
7-3	Route 36 Weekday Service Statistics .....	137
7-4	Route 36 Weekday Ridership and Productivity Statistics.....	138
9-5	Routes 35 and 36: Fall 1987 Peak Loads .....	141
9-6	Routes 35 and 36: Spring 1987 Vehicle Deployment and Headways ...	142
9-7	Routes 35 and 36: Revised Scheduled Statistics with Coordinated Service.....	144
9-8	Routes 35 and 36: Recommended Service Levels.....	149

9-9	Route 35: On-Time Departure Performance.....	150
9-10	Route 36: On-Time Departure Performance.....	151
9-11	Route 36.8 Observed Schedule Statistics.....	151
10-1	Route 37 Weekday Service Statistics .....	155
10-2	Route 37 Weekday Ridership and Productivity Statistics.....	155
10-3	Impact of Route 37X Realignment on Route 35, 36, and 37 Trunk Riders.....	159
10-4	Estimated Average Peak Loads on Route 37X .....	162
10-5	Route 37 Schedule Statistics .....	168
10-6	Impacts of Service Refinements on Route 37 Outer End Ridership ....	170
10-7	Route 37 On-Time Performance.....	170
11-1	Route 38 Weekday Service Statistics .....	175
11-2	Route 38 Weekday Ridership and Productivity Statistics.....	175
11-3	Route 51 Weekday Service Statistics .....	178
11-4	Route 51 Weekday Ridership and Productivity Statistics.....	178
11-5	Ridership Impacts of Route 38X and 51X Alternatives .....	184
11-6	Passenger and Service Impacts of Route 38 Service Reductions.....	189
11-7	Route 38 Schedule Statistics .....	191
11-8	Route 51 Schedule Statistics.....	192
12-1	Route 40 Weekday Service Statistics .....	193
12-2	Route 40 Weekday Ridership and Productivity Statistics.....	195
12-3	Proposed Route 40 Schedule Statistics .....	199
12-4	Passenger and Service Impacts of Longer Route 40 Headways.....	201
12-5	Passenger and Service Impacts of Longer Route 40 Headways in Conjunction with an Extension around the Reservation Loop....	201
12-6	Route 40 Schedule Statistics .....	202
13-1	Route 50 Weekday Service Statistics .....	207
13-2	Route 50 Weekday Ridership and Productivity Statistics.....	207
13-3	Route 50 Schedule Statistics .....	211
14-1	Ridership and Cost Characteristics of Chestnut Hill Service.....	217
14-2	Evening and Weekend Service Provided on SOUTHBus Routes.....	218
15-1	Summary of All Changes Examined in South Corridor Bus Service Study.....	230
15-2	Summary of Recommended Changes .....	246



---

## South Corridor Bus Service Study Executive Summary

---

Bus service in the South Corridor involves thirteen local routes in the Boston neighborhoods of Dorchester, Hyde Park, Jamaica Plain, Mattapan, Roslindale, and West Roxbury, and in Brookline, Dedham, Norwood, Walpole, and Westwood. These routes, shown in Figure E-1, are as follows:

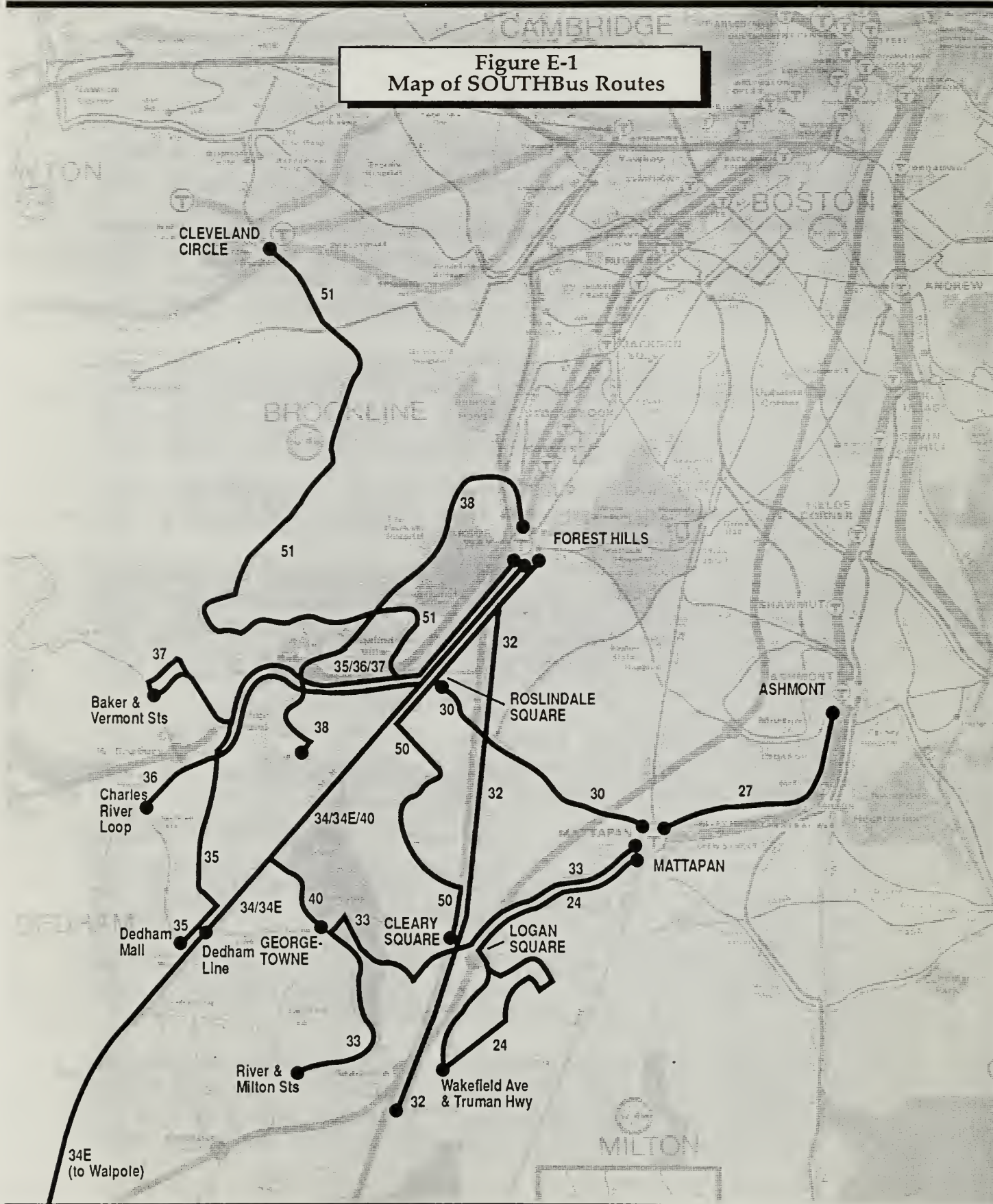
- Route 24 Wakefield Avenue/Truman Highway - Mattapan/Ashmont
- Route 27 Mattapan - Ashmont
- Route 30 Roslindale Square - Mattapan
- Route 32 Wolcott Square - Forest Hills
- Route 33 Dedham Line - Mattapan
- Route 34 Walpole Center - Forest Hills
- Route 35 Dedham Mall/Stimson Street - Forest Hills
- Route 36 Charles River Loop/Dedham Line - Forest Hills
- Route 37 Baker/Vermont Streets - Forest Hills
- Route 38 Wren Street - Forest Hills
- Route 40 Georgetowne - Forest Hills
- Route 50 Cleary Square - Forest Hills via Clarendon Hills
- Route 51 Cleveland Circle - Forest Hills

Most of the service in the South corridor is concentrated in the Boston neighborhoods. In general, the routes in this area can be broken down into two categories: those that feed the Orange Line at Forest Hills and those that feed the Mattapan High Speed Line and/or the Red Line at Ashmont. Additionally, one of the routes provides service between the Green Line at Cleveland Circle and Forest Hills. The majority of the service is directed toward Forest Hills. All of the routes provide local service, although some "limited" service is also provided on one route (Route 34).

Peak period service is focused on rapid transit stations, to provide commuters with feeder service to downtown Boston. All SOUTHBus routes provide service throughout the day, although some routes have little or no early AM or evening service, and all connect with at least one rapid transit



**Figure E-1**  
**Map of SOUTHBus Routes**





station. The area served by these routes is an old, well-established area with established travel patterns. Bus service in the area is fairly well utilized, with most peak period, peak direction trips at or near seated capacity. However, very little service is overcrowded.

Most of the work trips originating in the corridor are to downtown Boston and the Fenway/Parker Hill area. In addition, there is a significant amount of travel within the corridor between Jamaica Plain and Hyde Park, Roslindale and West Roxbury, West Roxbury and Roslindale, and Hyde Park and South Dorchester. There is little "circumferential" or crosstown work trip travel within or through the area.

The existing transit service in the SOUTHBus area – local bus, as well as rapid transit, the Green Line, and commuter rail – generally reflects these travel patterns. Each of the suburban communities is served by commuter rail, except Brookline, which is served by the Green Line. The Boston neighborhoods have commuter rail, rapid transit, and/or feeder bus service – the SOUTHBus routes – to the rapid transit system. SOUTHBus routes also provide all of the local transit service in the corridor. In addition, by providing access to the rapid transit system and to major bus terminals at Forest Hills, Mattapan, and Ashmont, SOUTHBus routes provide good connections to the rest of the Boston area.

Transit usage in the SOUTHBus area has increased as a result of the opening of the new Orange Line in May 1987 and the re-institution of commuter rail service on the Needham Line in October 1987. As of the Fall of 1987, MBTA pointchecks indicated that total ridership on routes connecting to the Orange Line had increased 17 percent, or 4,075 trips per day. Through February 1988, ridership to and from West Roxbury and Roslindale on the Needham Line was approximately 2,410 one-way trips per day. Although the re-institution of commuter rail service from West Roxbury and Roslindale would be expected to have drawn riders away from feeder bus service and the Orange Line, ridership on feeder bus routes has increased as well. On Routes 35, 36, 37, and 38, all of which serve West Roxbury, increases have actually exceeded those on other routes, at between 15 and 30 percent.

As is the nature of feeder bus service such as the SOUTHBus routes, most trips involve at least one transfer. However, most trips on SOUTHBus routes involve only one transfer, with less than five percent involving two or more transfers.\* Most transfers take place with the rapid transit system; these occur primarily at Forest Hills, Ashmont and Mattapan, with some also taking place at Cleveland Circle or Reservoir on the Green Line. In total, 42 percent of all SOUTHBus trips involve a transfer of this type. In addition, 31 percent of all

---

\*Not including transfers within the rapid transit system, e.g., Red Line to Green Line.

trips, or 7,650 weekday trips, involve transfers to other bus routes, mostly to routes operating beyond the SOUTHBus corridor.

Considering these existing travel and transfer patterns, the most attractive improvements from the perspective of existing riders and potential new riders would be those that improve service to downtown Boston and those that improve or eliminate transfers. In this respect, the Forest Hills station on the new Orange Line is a better connection point to the rapid transit system than Mattapan. Compared to the Mattapan High Speed Line and the Red Line, the Orange Line provides significantly faster service to downtown Boston and eliminates a transfer. In addition, the Orange Line serves the Back Bay and Park Square, while the Red Line does not.

### RECOMMENDED CHANGES

From Hyde Park and Mattapan, service could be improved by providing more direct service to the Orange Line at Forest Hills and/or direct service to the Red Line at Ashmont, eliminating the need to transfer with the Mattapan High Speed Line. The most cost-effective ways to accomplish this would be as follows:

- Provide better connections to Forest Hills by extending Route 30 from Roslindale Square to Forest Hills, and by extending the outer end of Route 40 past Georgetowne to Centre Street in the vicinity of Readville.
- Provide direct connections to the Red Line at Ashmont by extending both Route 24 and Route 33 from Mattapan to Ashmont throughout the day. (Extended service on these routes would replace Route 27 service.)

As further discussed below, each of these improvements, with the exception of the Route 30 extension, could be implemented without increasing costs by reallocating existing resources.

Service between West Roxbury and Roslindale, and from the two areas to downtown Boston could be improved by better coordinating existing services, extending the outer end of Route 38 to provide additional coverage, and providing evening service on Route 35. A number of alternatives were also examined to provide better crosstown service in West Roxbury. While most would be feasible, not enough new riders would be attracted to offset the inconvenience these changes would cause existing riders.

In addition, a large number of other service changes were examined that could increase ridership, the cost-effectiveness of the route, or both. In general, most that would increase ridership would also increase costs, and most that would improve efficiency would result in some ridership losses.

However, many would be beneficial in both areas. The recommendations listed below include improvements of this type, and those that attempt to balance the often competing goals of containing costs and increasing ridership. (A summary of the recommendations is also included in tabular form in Table E-1, and a map of the resulting route structure is shown in Figure E-2.) In total, these changes would increase ridership by 560 trips per day, while decreasing operating costs by \$274,000 per year. In addition, they should also provide significant service improvements to existing riders in terms of more direct service, fewer transfers, more reliable service, and more consistent headways.

Route 24 (Wakefield Avenue/Truman Highway - Mattapan),  
Route 27 (Mattapan - Ashmont), &  
Route 33 (Dedham Line - Mattapan)

- Extend Routes 24 and 33 from Mattapan to Ashmont. Replace Route 27 with the extended Route 24 and Route 33 service.
- Operate evening service on Route 33 until approximately 11:30 pm.
- Interline all Route 24 and 33 trips and coordinate service on the trunk between Ashmont and Logan Square. Operate service on each route at headways of 30 minutes in the AM peak, school and PM peak periods, 45 minutes in the base period, and 60 minutes during the evening, providing trunk headways of 15 minutes in the AM peak, school and PM peak periods, 22.5 minutes in the base period and 30 minutes in the evening.
- Relocate Route 24's outer end layover point to the intersection of Fairmount Avenue and Beacon Street before 11:00 AM.
- Operate all Route 33.6 trips as Route 33.5 trips.

By extending Routes 24 and 33 to Ashmont, direct service would be provided to the Red Line at Ashmont, eliminating the transfer with the Mattapan High Speed Line for 670 daily riders. These extensions would allow Route 27 to be eliminated, and if service on the two routes were interlined, the extensions could be implemented without any additional vehicles and without increasing operating costs. Further, due to the elimination of the Mattapan transfer and shorter headways that would be provided between Mattapan and Ashmont, overall ridership should increase by 160 trips per day (six percent), increasing fare revenue by \$6,000 per year.



Table E-1  
Summary of Recommendations

Ridership Impact	Impact on Pax Wait Time (hrs)*	Change in VSHs Provided	Annual Impact of Weekday Changes				Net Cost/ New Pax	Net Savings/ Pax Lost	Δ Pax Wait Time/Δ VSHs Operated	Impact on AM Peak Vehicle Reqmt
			Impact on Oper Costs	Impact on Fare Rev	Impact on Oper Deficit	Impact on New Pax				
Routes 24, 27 & 33 (Chapter 4)										
•Extend Routes 24 & 33 to Ashmont and coordinate service	160	-102.0	0.0	\$0	\$6,000	(\$6,000)	(\$0.15)	--	--	None
•Relocate Route 24's outer end layover point before 11:00 AM	0	0.0	0.0	\$0	\$0	\$0	--	--	--	None
•Operate all Route 33.6 trips as Route 33.5	0	0.0	0.0	\$0	\$0	\$0	--	--	--	None
•Overall Impact	160	-102.0	0.0	\$0	\$6,000	(\$6,000)	(\$0.15)	--	--	None
Route 30 (Chapter 5)										
•Extend Route 30 to Forest Hills	55	145.0	15.7	\$127,700	(\$900)	\$128,600	\$9.35	--	--	1
•Overall Impact	55	145.0	15.7	\$127,700	(\$900)	\$128,600	\$9.35	--	--	1
Route 32 (Chapter 6)										
•Revise Route 32.0 headways: 12 min. AM Peak headways	-55	11.9	-2.7	(\$18,300)	(\$5,000)	(\$13,300)	--	\$0.97	4.4	-1
12 min. PM Peak headways	30	-7.4	0.0	\$0	\$2,800	(\$2,800)	(\$0.37)	--	--	None
•Revise Route 32.1 headways: 13 min. School headways	65	-17.4	2.3	\$16,400	\$5,900	\$10,500	\$0.65	--	7.7	None
20 min. Evening headways	90	-41.5	0.0	\$0	\$8,000	(\$8,000)	(\$0.36)	--	--	None
•Overall Impact	130	-54.4	-0.5	(\$1,900)	\$11,700	(\$13,600)	(\$0.42)	--	--	-1
Route 34 (Chapter 7)										
•Operate Variations 34.3 and 34.5 as Variation 34.4:										
Early AM	5	-0.9	0.0	\$0	\$600	(\$600)	(\$0.48)	--	--	None
AM Peak	55	-16.0	0.0	\$0	\$6,500	(\$6,500)	(\$0.47)	--	--	None
PM Peak	65	-7.5	0.0	\$0	\$7,600	(\$7,600)	(\$0.47)	--	--	None
•Extend Route 34.0 trips to the Dedham Mall:										
PM Peak	45	-14.7	0.0	\$2,500	\$5,300	(\$2,800)	(\$0.25)	--	--	None
All Day	345	-126.0	0.0	\$2,300	\$40,400	(\$38,100)	(\$0.44)	--	--	None



**Table E-1 (cont.)  
Summary of Recommendations**

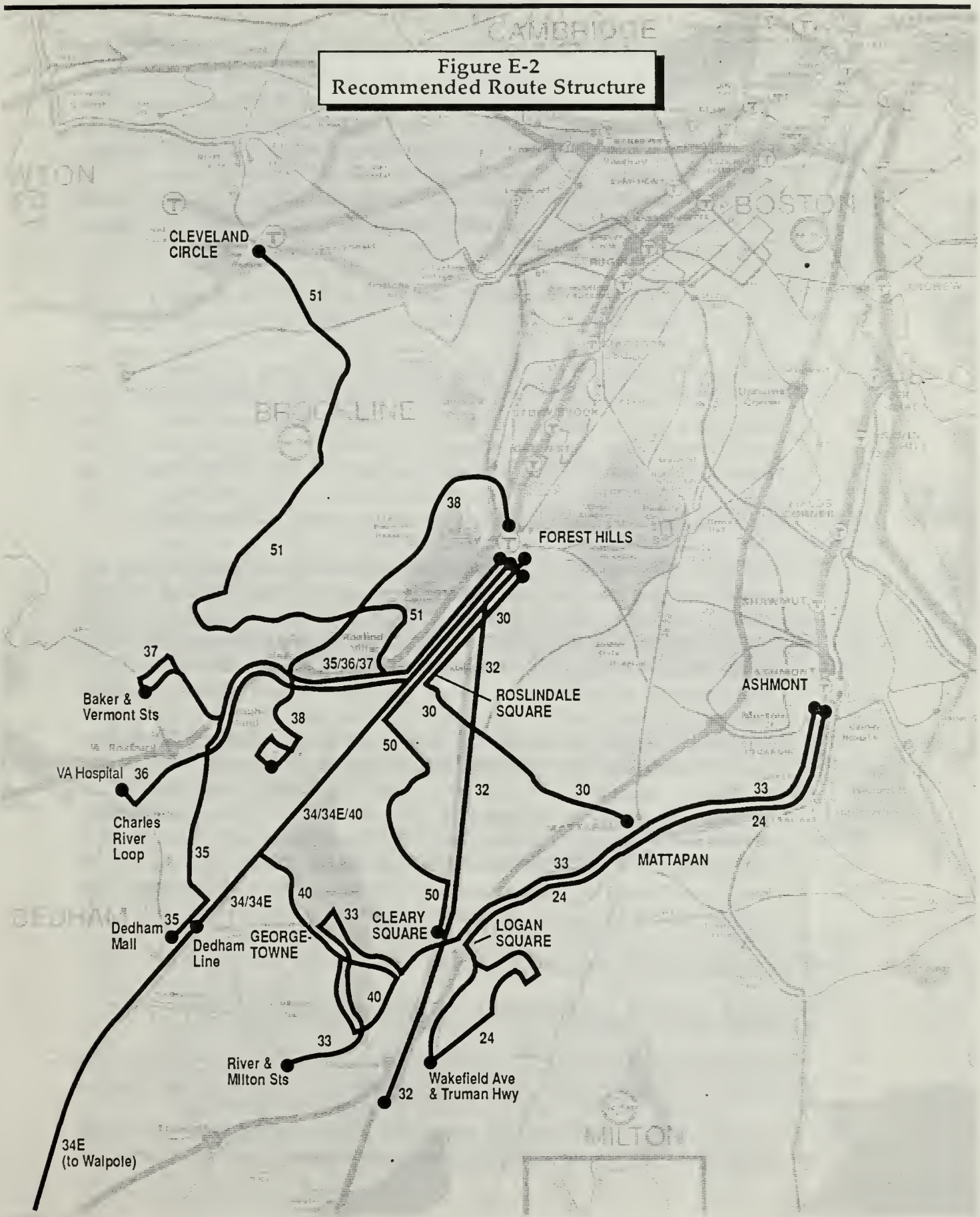
Ridership Impact	Impact on Pax Wait Time (hrs)*	Change in VSHs Provided	Annual Impact of Weekday Changes				Net Cost/ New Pax	Net Savings/ Pax Lost	Δ Pax Wait Time/Δ VSHs Operated	Impact on AM Peak Vehicle Reqmt
			Impact on Oper Costs	Impact on Fare Rev	Impact on Oper Deficit	Impact on				
Route 34 (cont.) (Chapter 7)										
•Eliminate Walpole Center Service	-285	NA	-12.0	(\$120,200)	(\$33,500)	(\$86,700)	--	\$1.22	0.0	-1
•Reduce Route 34.0 cycle times/modify headways:										
--AM Peak: Reduce cycle time from 54 to 40 min.; 8 min. headway	30	-10.7	1.4	(\$32,400)	\$3,500	(\$35,900)	(\$4.79)	--	7.6	-1
--School: Reduce cycle time from 56 to 46 min.; 12 minute headway	10	-2.4	1.2	(\$4,400)	\$1,200	(\$5,600)	(\$2.24)	--	2.0	None
--Evening: Increase headway from 48 to 62 min.	-20	9.8	-3.2	(\$67,300)	(\$2,400)	(\$64,900)	--	\$12.98	3.1	None
•Reduce AM Peak long trip cycle times from 108 to 92 min.	0	0.0	2.8	(\$13,600)	\$0	(\$13,600)	--	--	0.0	None
•Overall Impact	250	-168.4	-9.9	(\$233,100)	\$29,200	(\$262,300)	(\$4.20)	--	--	-2
Routes 35 & 36 (Chapter 9)										
•Replace 1/2 of Route 36 late evening service w/Route 35	20	7.3	0.0	\$0	\$1,900	(\$1,900)	(\$0.38)	--	--	None
•Coordinate Routes 35 & 36 with slightly lower service levels	10	10.0	-4.7	(\$56,300)	\$900	(\$57,200)	(\$22.88)	--	2.1	None
•Increase service to VA Hosp.	10	-4.4	0.0	\$0	\$900	(\$900)	(\$0.36)	--	--	None
•Overall Impact	40	12.9	-4.7	(\$56,300)	\$3,700	(\$60,000)	(\$6.00)	--	2.7	None
Route 37 (Chapter 10)										
•Coordinate with Routes 35 and 36	-20	-0.7	-2.5	(\$16,300)	(\$1,800)	(\$14,500)	--	\$2.90	--	None
•Overall Impact	-20	-0.7	-2.5	(\$16,300)	(\$1,800)	(\$14,500)	--	\$2.90	--	None

**Table E-1 (cont.)  
Summary of Recommendations**

Ridership Impact	Impact on Pax Wait Time (hrs)*	Change in VSHs Provided	Annual Impact of Weekday Changes				Net Cost/ New Pax	Net Savings/ Pax Lost	Δ Pax Wait Time/Δ VSHs Operated	Impact on AM Peak Vehicle Reqmt
			Impact on Oper Costs	Impact on Fare Rev	Impact on Oper Deficit	Impact on				
Route 38 (Chapter 11)										
•Extend outer end of Route 38	35	34.1	0.0	\$0	\$2,800	(\$2,800)	(\$0.32)	--	--	None
•Increase School & PM Peak headways to 24 min. to improve reliability	-15	5.3	0.0	\$0	(\$1,200)	\$1,200	--	(\$0.32)	--	None
•Consistent Route 38 Evening headways: shift late trip	--	NA	0.0	\$0	\$0	\$0	--	--	--	None
•Overall Impact	20	5.3	0.0	\$0	\$1,600	(\$1,600)	(\$0.32)	--	--	None
Route 40 (Chapter 12)										
•Extend Route 40 to River St.	85	21.7	0.0	\$0	\$6,375	(\$6,375)	(\$0.30)	--	--	None
•Longer Route 40 headways with extension:										
60 min. Base headways	-70	45.1	-6.4	(\$35,700)	(\$5,300)	(\$30,400)	--	\$1.74	7.0	None
60 min. School headways	-25	17.1	-2.4	(\$19,900)	(\$1,900)	(\$18,000)	--	\$2.88	7.1	None
•Overall Impact	-10	83.9	-8.8	(\$55,600)	(\$825)	(\$54,775)	--	\$21.91	9.5	None
Routes 50 and 51 (Chapters 11 and 13)										
•30 min. School headways	-65	25.9	-3.5	(\$38,000)	(\$5,355)	(\$32,645)	--	\$2.01	7.4	None
•Overall Impact	-65	25.9	-3.5	(\$38,000)	(\$5,355)	(\$32,645)	--	\$2.01	7.4	None
TOTAL IMPACTS										
	560	-52.5	-14.1	(\$273,500)	\$43,320	(\$316,820)	(\$2.26)	--	--	-2

\* In cases where transfers would be eliminated, passenger wait time savings include actual time savings plus five minutes for elimination of the transfer.

**Figure E-2**  
**Recommended Route Structure**





With or without extended service to Ashmont, service on Routes 24 and 33 should be coordinated along the trunk. At this time, there is no coordination, and peak period headways on the trunk vary from zero to 20 minutes. Since the cycle times and loading characteristics of the two routes are similar, service should be scheduled so that the two routes alternate trips along the trunk in both directions. If implemented as discussed in Chapter 4, coordination of the two routes would not have any operating cost impact, nor would it increase vehicle requirements.

At the outer end of Route 24, travel times could be reduced for 75 existing riders by moving the outer end layover point before 11:00 am. Since the outer-end is a loop and the layover point is near the end of the loop, inbound riders boarding at the beginning of the loop must board an "outbound" trip and then layover with the bus until the beginning of the inbound trip. By moving the layover point to the beginning of the loop at the intersection of Fairmount Avenue and Beacon Street during the period when most loop ridership is in the inbound direction, the layover would be eliminated for those riders. This change would not have any operating cost or vehicle impact.

On Route 33, variations 33.5 and 33.6 travel around a loop along the middle of the route in different directions. Before 2:00 pm, service operates around the loop only in a clockwise direction (as Route 33.5), and after that time, only in a counter-clockwise direction (as Route 33.6). Since no passenger trips are made completely within the loop, no one is left unserved as a result, but it means that riders board on one side of the street during part of the day and on the other side of the street during the rest of the day. This is confusing to occasional riders and does not provide any operational benefits. The two variations also vary at the outer end of the route. These differences also do not appear to be justified by demand. Of the two variations, Route 33.5 appears to provide the most direct and responsive service. Therefore, since the differences that the two variations provide are not useful, all Route 33.6 trips should be operated as Route 33.5 trips. This change would also have no operating cost or vehicle impact.

#### Route 30 (Roslindale Square - Mattapan)

- Extend Route 30 from Roslindale Square to Forest Hills.
- Operate extended Route 30 at headways of 20 minutes during peak periods, 30 minutes during the mid-day, and 50 minutes in the evening.

As mentioned above, Forest Hills is a more attractive transfer point than Mattapan for trips to downtown Boston, due to shorter travel

times and the elimination of at least one transfer. For Route 30 riders, total travel time savings resulting from direct connections with Forest Hills would be large: 12 to 18 minutes to the Financial District and Government Center, and 24 to 27 minutes to the Back Bay and Park Square. For Financial District/Government Center riders, one transfer would be eliminated (with the Mattapan High Speed Line), and for Back Bay/Park Square riders, two transfers would be eliminated (one with the Mattapan High Speed Line and one with the Green Line or Orange Line in downtown Boston).

Up to 400 existing Route 30 riders would benefit from the extension. Including a time value for transfers of five minutes, an extension would save these riders 145 hours per day. At the service level described, which is essentially the same as is now provided, the extension would cost \$127,700 per year and require one additional vehicle during peak periods.

#### Route 32 (Wolcott Square/Cleary Square - Forest Hills)

- Reduce cycle times on variation 32.0 from 42 to 36 minutes throughout the day. Use the lower cycle time to reduce AM peak vehicle requirements by one vehicle and to reduce PM peak headways from 14 to 12 minutes.
- Reduce the PM peak cycle time on variation 32.1 from 56 to 48 minutes. Use the lower cycle time to reduce PM peak headways from 14 to 12 minutes.
- Increase the school period cycle time on variation 32.1 from 42 to 52 minutes. Add one vehicle, reducing headways from 15 to 13 minutes to reduce crowding.
- Reduce the evening cycle time on variation 32.1 from 60 to 40 minutes. Use the lower cycle time to reduce evening headways from 30 to 20 minutes.
- Adjust booktimes within existing or proposed cycle times on both variations during the AM peak to reflect current operating conditions.

Existing cycle times are longer than necessary during many periods on both variations and can be reduced. The lower cycle times will then allow either fewer vehicles to be deployed, or a higher level of service to be provided. During the AM peak, one vehicle could be saved, and operating costs reduced by \$13,300 per year. During the PM peak and evening periods, the cycle time changes are not large enough to save a vehicle, so headways should be reduced. These headway reductions

should increase ridership by 120 trips per day without increasing the number of vehicle hours provided.

During the school period, an increase in the cycle time is needed to improve reliability. Also, with existing headways, there is crowding on Route 32.1 trips. With the cycle time increase, it would be necessary to add one vehicle to avoid more severe crowding. The net operating cost of this additional service would be \$10,500 per year. During the early AM and base periods, cycle time changes are not needed, but one-way running time adjustments within the existing cycle times would improve reliability.

#### Route 34 (Walpole/Dedham Line - Forest Hills)

- Increase service north of LaGrange Street by replacing limited service (Routes 34.3 and 34.5) with non-limited service (34.4).
- Schedule variations to prevent crowding on long trips.
- Add one 34.0 trip inbound prior to the 5:45 am inbound East Walpole trip.
- Reschedule 34.0 trips at even 15-minute intervals during the school period, to allow 34.8 trips to follow 34.0 trips at a small interval.
- Renumber redundant trips to reduce route variations.
- Eliminate Walpole Center service.
- Increase service to the Dedham Mall.
- Reduce 34.0 cycle times throughout the day. Use the reduced cycle times to reduce vehicle requirements by one during the AM peak, school, and evening periods.
- Reduce the AM peak long-trip cycle time from 108 to 92 minutes to reduce vehicle requirements by one.
- Provide park and ride service in the Route 128/Washington Street area.
- Reduce evening service from 48 to 62 minute headways.

Route 34 is a long route with nine different variations. Thus, scheduling and operating the route is complicated. One measure that can be taken to simplify the route without any service or ridership impacts is to eliminate redundant variations. Variations 34.3 and 34.5



provide local service between Walpole Center and the Dedham line and limited service in the peak direction during the AM and PM peaks. Thus, both variations could use the same number. In the evening, variation 34.3 operates outbound via the Dedham Mall, and could be scheduled as variation 34.7. Variation 34.9 is always through-routed with a 34.0 trip, thus operating between East Walpole and Forest Hills in the same manner as 34.6. Additionally, because "limited" service usually stops at most stops, variations 34.3 and 34.5 should be changed to local operation and renumbered as variation 34.4 trips.

Crowding on Route 34 occurs on the northern segment of the line, where Route 34.0 operates. Four of the recommendations listed above are aimed at reducing this crowding. Replacement of limited service with local service will increase service frequency on this portion of the route and can be implemented at minimal cost because local trips can be scheduled within existing limited trip cycle times. This change, in addition to relieving crowding, could attract up to 125 new passengers. Additional measures to reduce crowding include addition of a 34.0 trip inbound to precede the 5:45 am inbound East Walpole trip, scheduling alternative variations to prevent crowding on the long trips, and rescheduling school period trips to allow long (34.8) trips to follow short (34.0) trips. All three of these measures aim at preceding long trips with short trips to reduce the number of passengers boarding the long trips north of the Dedham line.

Prior to the Fall of 1987, Route 34 service terminated at East Walpole. However, service was extended in 1987 to provide service into Walpole and to the Walpole Center commuter rail station. However, ridechecks conducted during the Fall of 1988 (one full year after the service was extended) show limited ridership on this segment of the route. In fact, only 140 daily boardings and 145 daily alightings were observed on this portion of the route, for an average of 23 passengers per hour. Elimination of the Walpole Center extension would save over \$120,000 annually.

Additional increases in productivity could be attained by increasing service to the Dedham Mall. The mall is already a major trip generator along the route, with close to 1,300 passengers boarding or alighting annually. Most of the riders who use the mall stop are transit-dependent, and most service is only provided at 30 minute headways. Also, only one trip is provided outbound via the mall during the PM peak. Service to the mall could be increased at no cost by adding a stop on Washington Street at the entrance to the mall on variation 34.5 trips, or at minimal cost by either replacing variation 34.5 with 34.7 to both increase service to the mall and increase service

north of LaGrange Street or by extending variation 34.0 trips to the mall. Extension of Route 34.0 service to the mall would provide the largest benefit to the greatest number of passengers (344 new passengers and 126 hours less passenger wait time), at a cost of only \$2,500 per year.

Cycle times are longer than necessary during many periods on Route 34.0 and on the Walpole variations during the AM peak. Cycle times can be reduced to allow fewer vehicles to be deployed or a higher level of service to be provided. During the AM peak, two vehicles could be saved, and operating costs reduced by \$46,000 per year. During the school and evening periods, one vehicle could be saved and operating costs could be reduced by \$71,700 per year. Finally, evening service could be reduced within revised cycle times to 62 minute headways for cost savings of \$67,300 per year, with a loss of only 20 passengers and an increase in wait time of 3.1 hours for the remaining passengers.

The service area of Route 34 could be effectively expanded by the provision of a park-and-ride lot in the Route 128/Washington Street area. This lot could attract current auto commuters from beyond the SOUTHBus service area. The lot, which could be located at the Dedham Mall (contingent upon agreement with the mall owner), would attract commuters from congested Route 128. While the ridership impact of this recommendation has not been fully assessed, it could be tested as a no-cost (or low-cost) improvement, depending upon agreement from the mall owner.

**Route 35 (Dedham Mall/Dedham Line - Forest Hills),  
Route 36 (Charles River Loop - Forest Hills), &  
Route 37 (Baker/Vermont Streets - Forest Hills)**

- Coordinate Route 35, 36, and 37 service between West Roxbury's Centre Street business district and Forest Hills from the beginning of service until the end of the PM peak.
- Shift half of Route 36's evening service to Route 35 to provide evening service on Route 35, and coordinate evening service on the two routes.
- Operate Routes 35, 36, and 37 at 15 minute AM peak headways, 30 minute base period headways, 20 minute school period headways, and 18 minute PM peak period headways; operate Routes 35 and 36 at 60 minute evening headways.
- Operate all Route 36 trips to the VA Hospital.

- Increase Route 36.8 inbound running times and provide more layover time at Forest Hills, to solve reliability problems.

Routes 35, 36, and 37 serve the same alignment between the Centre Street business district and Forest Hills, and most ridership on each route is within that segment. At present, service on the three routes is not coordinated, and irregular headways are provided. Loads on the outer ends of the routes are similar, and only relatively minor cycle time changes are necessary to coordinate the three routes.\* Coordinated service on the three routes would provide a high level of service between Forest Hills, Roslindale Square, and West Roxbury throughout the day, with trunk headways at one-third of those listed above for each route individually. Overall, coordination of the three routes should increase ridership by about 20 trips per day, in spite of slightly lower overall service levels, and reduce operating costs by \$16,300 per year.

After 9:00 pm, 30 minute headways are operated on Route 36 while no service is operated on Route 35. The 30 minute headways are needed on the trunk segment of the route between Forest Hills and the Centre Street business district, but not along the outer end. Therefore, excess service could be shifted from Route 36 to Route 35, to improve evening service coverage, while maintaining 30 minute trunk headways. This no-cost measure should also increase ridership by 20 trips per day.

With coordinated service, there would be enough slack time in Route 36's cycle time to operate all Route 36 trips to the VA Hospital as variation 36.8. This, plus the operation of evening service on Route 35, would make the VA Hospital transit-accessible to evening visitors and to workers on all three shifts at no additional cost to the MBTA. Ridership increases would likely be small, possibly only 10 new trips per day, but again, there would be no additional cost to provide the service.

Throughout the day, inbound running times and layover times at Forest Hills need to be increased on Route 36.8. At present, actual inbound running times exceed book times by up to five minutes. This, coupled with a lack of adequate layover time at Forest Hills, encourages drivers to leave from the Charles River Loop early in order to arrive on time. This problem only occurs on inbound trips; on outbound trips there is excess time. Therefore, the additional time needed can be taken from outbound trips and layover time at the

---

\*With the exception of Route 37 in the AM peak - see Chapter 10.



Charles River Loop. There is no need to increase cycle times, headways, or vehicle requirements.

### Route 38 (Wren Street - Forest Hills)

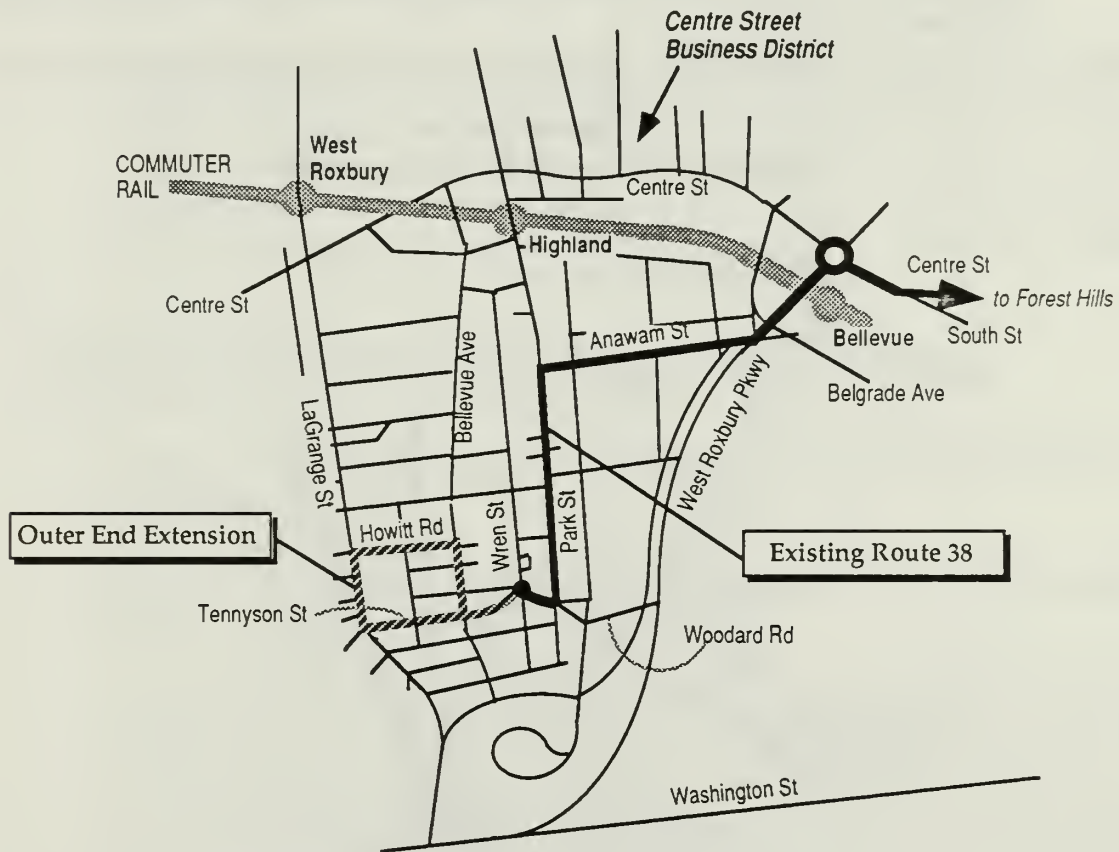
- Extend the outer end of Route 38 to LaGrange Street to improve service coverage (see Figure E-3). Operate the extended service with the same number of vehicles as are presently deployed, by increasing headways from 22 to 25 minutes during peak periods and from 45 to 50 minutes during other periods.
- Shift the last evening round-trip from a 10:40 pm outbound departure to an 8:00 pm outbound departure, to eliminate gaps in service.
- Increase school and PM peak headways from 22 to 24 minutes to solve reliability problems.
- Adjust booktimes within existing cycle times during the AM peak, base and evening periods to reflect current operating conditions.

Route 38 is the only route that serves West Roxbury's Bellevue neighborhood. Existing service coverage is limited and could be improved by extending the outer end from Wren Street to LaGrange Street as shown in Figure E-3. Since existing service is underutilized, extended service could be operated with the same number of vehicles by slightly increasing headways. Overall, the extension should attract 105 new trips, but longer headways would result in the loss of 70 existing trips; thus the net gain would be 35 trips per day.

During the evening, Route 38's current schedule is very irregular, with outbound headways ranging from 25 to 120 minutes. In the inbound direction, headways are as long as 128 minutes. (In the Winter 1989 schedule, outbound trips departed from Forest Hills at 6:40 pm, 7:20 pm, 8:40 pm, and 10:40 pm; inbound trips depart at 6:35 pm, 7:01 pm, 7:44 pm, 9:05 pm, and 11:13 pm.) Ridership on all trips is fairly low, averaging four passengers inbound and 12 passengers outbound in the Spring of 1986.

The reason for the irregular schedule is unclear, and the irregularity is presumably inconvenient and confusing to riders. In the absence of a specific rationale for this schedule, more consistent headways should be provided. Considering the low ridership on existing trips, the most cost-effective way to provide regular headways would be to shift the last trip from 10:40 pm outbound to 8:00 pm outbound, with service ending after the 8:40 pm outbound round-trip. While this would

Figure E-3  
Route 38 Outer End Extension



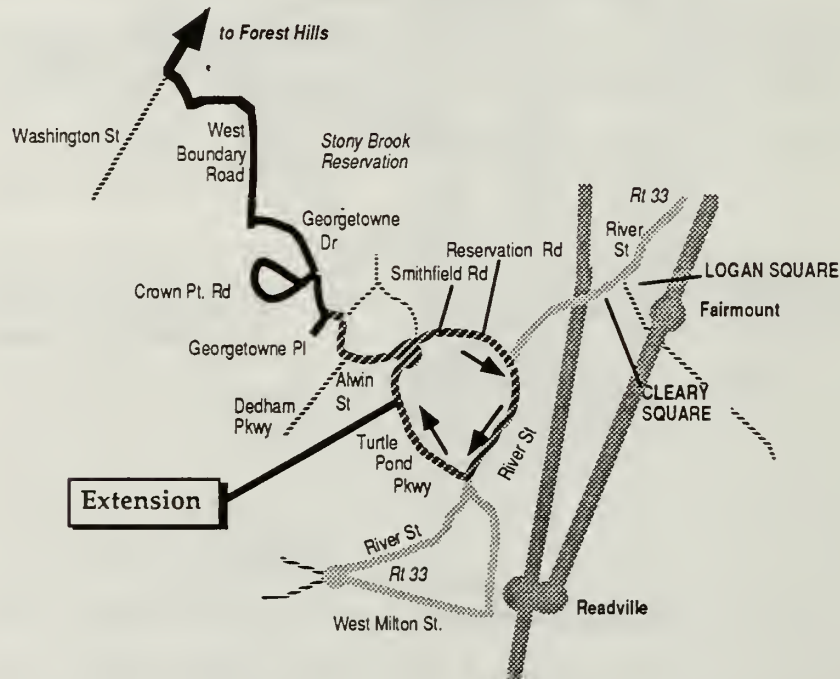
reduce the span of service, it would also eliminate long gaps in early evening service, simplify the route, and present a more rational schedule to the public.

During the school and PM peak periods, service is now operated with a 44 minute cycle time. Running times exceed booktimes during these periods to the extent that a large number of late departures are occurring. To eliminate this problem without increasing costs, headways should be increased to 24 minutes, increasing the cycle time to 48 minutes. During other periods, cycle times remain adequate, but running time adjustments should be made within those cycle times to improve schedule adherence.

### Route 40 (Georgetowne - Forest Hills)

- Extend the outer end of Route 40 to River Street to provide direct connections to the Orange Line at Forest Hills from more of Hyde Park (see Figure E-4).

Figure E-4  
Extension of Route 40 past Georgetowne



- During peak periods, operate the extended service with the same number of vehicles as are presently deployed, by increasing headways from 25 to 30 minutes. During the mid-day, operate 60 minute headways to save one vehicle.

As discussed earlier, bus connections to Forest Hills can provide faster service to downtown Boston than connections through Mattapan. An extension of Route 40 to River Street could provide direct connections from an area of Hyde Park that now only has service to Mattapan. As with an extension of Route 38, an extension of Route 40 could also be accomplished within existing vehicle requirements by increasing headways slightly. Route 40 is currently underutilized throughout the day so that longer headways would not create crowding problems. Overall, including the impact of longer headways, the extension



should increase ridership by 85 trips per day, or seven percent. Since the extended service would be operated with the same number of vehicles and with the same service span, there would be no significant impact on operating costs.

The segment of Route 40 beyond Washington Street is very lightly utilized during the base and school periods, with average loads of less than 11 passengers per trip. As a result, headways during these periods could be increased to save one vehicle without causing undue inconvenience to existing riders. Sixty minute headways, although they would result in a loss of 95 trips per day, would save 8.8 vehicle hours and reduce operating costs by \$55,600 per year.

#### Route 50 (Cleary Square - Forest Hills via Clarendon Hills) & Route 51 (Cleveland Circle - Forest Hills)

- Increase school period headways on Routes 50 and 51 from 20 to 30 minutes.
- Adjust Route 51 booktimes within existing cycle times during other periods to reflect current operating conditions.

Route 50 and Route 51 service is interlined throughout the day. During the school period, both operate with excess capacity. Service could be more efficiently provided by operating both routes at 30 minute headways to save two vehicles. Although this would result in a loss of 65 passengers, the passenger impacts would be relatively small compared to the vehicle savings - passenger wait time for remaining passengers would increase by only 7.4 hours for each vehicle hour saved and operating costs would be reduced by \$37,600 per year.

### OTHER ISSUES

#### Additional Evening and Weekday Service

At the Boston Transportation Department's community transit workshops, SOUTHBus area residents expressed a desire for more evening and weekend service. During the evening, service coverage could be significantly expanded without additional expense by shifting service from Route 24 to Route 33, and from Route 36 to Route 35, as recommended above. On Sundays, service levels are so low that it would not be possible to shift service from one route to another to expand service coverage. Therefore, expanded service coverage would require new service at additional cost. The largest increase in service coverage for the cost would be Sunday service on Route 33 or an extended Route 40, either of which could serve much of the area of both routes. Route

40 may be the more attractive of the two, due to slightly shorter headways, slightly lower cost, service to Forest Hills instead of Ashmont, and higher Saturday ridership, indicating that ridership on Sundays would also be higher. The cost of additional service on other routes (Routes 38, 50, and 51), based on evening and Saturday performance or the duplication of service that would result, would be relatively high, and therefore, additional service should be considered for policy reasons only.

#### Holding Buses at Forest Hills Until Trains Have Unloaded

Missed transfers that occur at Forest Hills when buses leave as trains are unloading could be avoided by installing beacons on the bus platforms that flash as trains arrive at the station; in the San Francisco Bay Area, trains entering stations trigger a sensor in the track that turns on a flashing beacon signaling bus drivers to hold until transfers have been made. A similar program for Forest Hills should be investigated.

---

# 1. Introduction

---

## OVERVIEW

The South Corridor Bus Service Study is one of a series of bus studies commissioned by the MBTA to examine existing bus service to determine whether available resources are being used as effectively as possible. Specifically, this study examines the effectiveness of current bus service on thirteen local routes in the Boston neighborhoods of Dorchester, Hyde Park, Jamaica Plain, Mattapan, Roslindale, and West Roxbury, and in Brookline, Dedham, Norwood, Walpole, and Westwood. These routes, shown in Figure 1-1, are as follows:

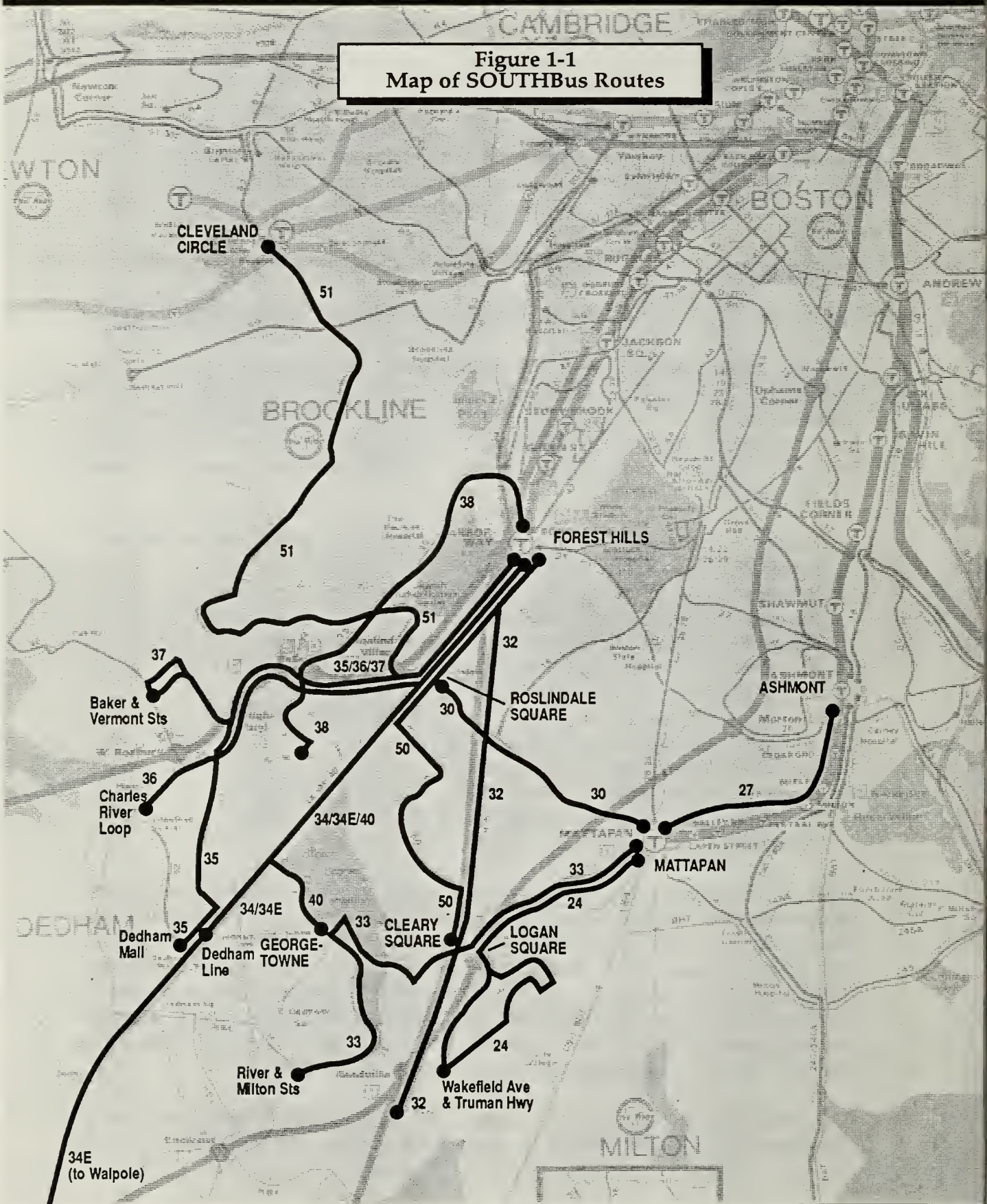
- Route 24 Wakefield Avenue/Truman Highway - Mattapan/Ashmont
- Route 27 Mattapan - Ashmont
- Route 30 Roslindale Square - Mattapan
- Route 32 Wolcott Square - Forest Hills
- Route 33 Dedham Line - Mattapan
- Route 34 Walpole Center - Forest Hills
- Route 35 Dedham Mall/Stimson Street - Forest Hills
- Route 36 Charles River Loop/Dedham Line - Forest Hills
- Route 37 Baker/Vermont Streets - Forest Hills
- Route 38 Wren Street - Forest Hills
- Route 40 Georgetowne - Forest Hills
- Route 50 Cleary Square - Forest Hills via Clarendon Hills
- Route 51 Cleveland Circle - Forest Hills

Most of the service in the South corridor is concentrated in the Boston neighborhoods. In general, the routes in this area can be broken down into two categories: those that feed the Orange Line at Forest Hills and those that feed the Mattapan High Speed Line and/or the Red Line at Ashmont. Additionally, one of the routes provides service between the Green Line at Cleveland Circle and Forest Hills. The majority of the service is directed toward Forest Hills. All of the routes provide local service, although some "limited" service is also provided on one route (Route 34).

Peak period service is focused to and from rapid transit stations to provide commuters with feeder service to downtown Boston. All SOUTHBus routes



**Figure 1-1**  
**Map of SOUTHBus Routes**



provide service throughout the day, although some routes have little or no early AM or evening service, and all connect with at least one rapid transit station. In addition, the area is served by the Orange Line, the Riverside branch of the Green Line and three commuter rail lines: the Needham and Franklin lines to Back Bay and South Station, and the the Fairmount line to South Station.

## STUDY PROCESS

This study examined the thirteen bus routes from two primary perspectives: (1) how well each route performs, and (2) the effectiveness of each route within the overall system. This process involved a number of steps:

- Data collection
- Market analysis
- Assessment of existing service
- Identification of service alternatives
- Evaluation of alternatives
- Conclusions/recommendations

In addition, the Boston Transportation Department (BTD) conducted a number of community transit workshops in the summer of 1988 to identify community transit needs. In the SOUTHBus area, these workshops were held in Jamaica Plain, Mattapan, West Roxbury, Roslindale, and Hyde Park. Following these workshops, the BTD made a number of recommendations for possible improvements to MBTA service in those areas.<sup>1</sup> Evaluations of those possible changes and strategies to address other issues raised are also included in this study.

## Data Collection

Data collection for the SOUTHBus study involved six major types of data: (1) field checks, (2) ridechecks, (3) pointchecks, (4) on-board passenger surveys, (5) demographic information, and (6) service statistics and cost information. The field checks were conducted to determine/verify stop locations and route mileages. Ridechecks provided information on ridership, bus running times, and schedule adherence, and the passenger surveys provided information about the trips being made, socio-economic characteristics of the riders, and a quality of service assessment.

---

<sup>1</sup>Howard/Stein-Hudson Associates, Inc., for the Boston Transportation Department, Boston Neighborhood Transit Service Workshops, September 1988.



The field checks, ridechecks, and passenger surveys were collected by Cambridge Systematics, Inc., in the Spring of 1986. Since this was before the opening of the new Orange Line in May 1987, pointcheck data collected by the MBTA through the Fall of 1987 were used to update the ridership data to include the impact of the new Orange Line on SOUTHBus ridership.

Overall, 1,235 weekday runs, 451 Saturday runs, and 110 Sunday runs were ridechecked. This resulted in sample sizes of 98 percent of a typical weekday schedule, 50 percent of a Saturday schedule, and 29 percent of a Sunday schedule. Passenger surveys were only conducted for weekday service, and approximately 3,250 useable surveys were collected. Based on average daily ridership in the Spring of 1986 of 30,040 trips (representing approximately 15,020 individuals), 22 percent of all weekdays riders were surveyed.

Demographic and development data were collected in order to analyze the market served by SOUTHBus routes. The primary data sources used were 1980 U.S. Census journey-to-work data and development data produced by the Metropolitan Area Planning Council (MAPC) and the individual cities and towns.

Bus service statistics and cost information are based on information supplied by the MBTA. All operating costs and fare revenues are in 1988 dollars. Service statistics are based on the Winter 1988 schedule, and fare revenues are based on estimated Fall 1987 ridership levels. Winter 1988 schedule statistics are the same as Spring 1986 except for the following changes:

- **Route 32** Headways were reduced from 24 minutes during the early AM and six minutes during the AM peak periods to 20 and five minutes, respectively. Headways were increased during the base, school, and PM peak periods from 12, 12, and six minutes to 15, 15, and eight minutes. In total, six trips were added during the AM peak, nine trips were eliminated from the base period, three trips were eliminated from the school period, and six trips were eliminated from the PM peak.
- **Route 34** Service on Route 34 was extended from East Walpole to Walpole Center to provide for connections with commuter rail. Additionally, two trips were added to the morning service.
- **Route 36** Headways were reduced from 24 to 22 minutes on variation 36.8 in the AM peak for an effective one minute headway reduction on combined Route 36.0/36.8 service from 11 to ten minutes.
- **Route 38** Service was reduced on this route throughout the day, with increases in headways from 20 to 22 minutes during the AM peak, from 15 to 22 minutes in the PM peak, and from 30 to 40 minutes during the



base. Two trips were added, one during the evening and one in the late evening.

- **Route 40** The same number of trips that were provided in the spring of 1986 are still provided, but headways were changed to 25 minutes throughout the day. This is a reduction from 30 minute headways during the AM peak, base and school periods and an increase from 20 minute headways during the PM peak and evening periods.
- **Route 50** One round trip was eliminated from the base period, increasing the headway from 40 to 46 minutes.

### **Market Analysis/Assessment of Existing Service**

Based on the data described above, general socio-economic and travel characteristics of all residents of the SOUTHBus area were matched with similar characteristics of SOUTHBus riders. This analysis provided information useful for identifying which segments of the overall SOUTHBus market are served by SOUTHBus routes and major trip attractors and generators that are not served. Development projections provided information for analysis of how well existing routes could serve planned development and where new service may be needed in the future.

### **Identification and Evaluation of Alternatives for Improved Service**

Based on the market analysis, the BTD's community transit workshop input and an assessment of each individual route, a number of alternatives were developed for each route. These alternatives addressed the following:

- **Ridership**, including overall ridership and ridership by segment, transfers, and passenger loads.
- **Route alignments**, based on how well each route's alignment serves area residents and other nearby trip attractors and generators. Changes examined include minor re-routings, route extensions, major changes that could significantly alter the character of a route, route combinations, and through-routing.
- **Reliability**, including on-time performance at the beginning of and along the route and its impact on transfers. Alternatives examined include changes to cycle times, deployment of additional vehicles, and holding strategies.
- **Schedules**, in terms of how schedule changes would impact route productivity, passenger convenience and wait time, passenger loads, and travel times.

The evaluation of these alternatives involved the impact on both the MBTA and its passengers. Of primary concern was the impact on the MBTA operating deficit, vehicle requirements, the ability to attract new ridership, and the impact on existing riders in terms of wait time and overall travel time.

### Conclusions/Recommendations

Many of the service changes discussed in this report would either reduce costs at the expense of ridership or require increased expenditures to increase ridership. However, there are also a number of changes that could both reduce costs and increase ridership. While all possible changes and their impacts are summarized in the final chapter, the final recommendations are largely based upon the latter type of service changes and are intended to represent a balance between the goals of reducing costs and increasing ridership.

### ORGANIZATION/ADDITIONAL INFORMATION

The following sections summarize the major findings, conclusions, and recommendations of the SOUTHBus Study. More detailed information specific to individual routes and comparison data on all routes is contained in two separately bound documents: Technical Supplement 1 and Technical Supplement 2. The contents of these supplements is outlined in the Table of Contents for this report. In general, Technical Supplement 1 contains descriptive route information, ridership, service and performance data, and financial data. Technical Supplement 2 includes summaries of the passenger survey results and 1980 U.S. Census journey-to-work data pertinent to the corridor, and schedule statistics for each of the routes.

---

## 2. Market Analysis

---

### GENERAL STUDY AREA CHARACTERISTICS

The SOUTHBus corridor includes the areas of Boston, Brookline, Dedham, Norwood, Walpole, and Westwood. Most of the bus service in the corridor is concentrated in the Boston neighborhoods—the southern half of Dorchester, Hyde Park, Jamaica Plain, Mattapan and West Roxbury. With the exception of service to the Dedham Mall near the northern border of Dedham, the suburban towns are served by only one route (Route 34E). Part of Brookline is included in the study area because one route (Route 51) connects Cleveland Circle with Forest Hills.

All of the bus routes in the corridor have at least one terminal at a rapid transit station. Most routes (nine of 13) feed the Orange Line at Forest Hills, while four feed Mattapan and/or Ashmont. One route (Route 51) feeds the Green Line at Cleveland Circle as well as the Orange Line at Forest Hills. In addition, all routes except two are radial in nature. The two "circumferential" routes (Routes 30 and 51), however, also act as radial routes in most respects.

### Population/Employment

In 1980, the SOUTHBus area had a population of 300,850 persons, representing 5.2 percent of the state's population. As with much of the Boston area, population has declined slightly since 1980, and by 1990, MAPC estimates that the area's population will have dropped to 294,960. Moderate population decreases are also expected to continue beyond that time for the foreseeable future at approximately 0.2 percent per year.

While population has declined, employment has increased and is projected to continue to increase. In 1980, there were 110,540 jobs in the SOUTHBus area; through 1985, employment had increased to 113,830 jobs, and by 1995, MAPC projects that employment will total 122,127 jobs. Most of the employment growth in the SOUTHBus corridor has occurred and will continue to occur in the suburban towns. In Boston, most job growth has occurred downtown, while in the SOUTHBus area neighborhoods, employment has remained fairly stable.



As would be expected, both population and employment densities decline with distance from downtown Boston. The highest population densities are in Dorchester, Jamaica Plain, Mattapan, and Roslindale, at 10,000 to 13,000 persons per square mile. In the suburban towns, densities are 1,000 to 3,000 persons per square mile. Hyde Park and West Roxbury fall in between at 6,000 and 8,000, respectively.

Employment densities vary throughout the corridor. The highest densities are in Mattapan, Jamaica Plain, South Dorchester, and Norwood, at 2,200 to 3,900 jobs per square mile (1990 estimate). In Roslindale, West Roxbury, and Dedham, employment densities are between 1,000 and 2,000 jobs per square mile, while in South Brookline, Walpole, and Westwood, employment densities are below 1,000 per square mile.

The decline in population coupled with increases in employment in the SOUTHBus corridor correspond with overall trends seen throughout most established areas in Eastern Massachusetts. Population declines are mainly due to two factors: birthrates in the Boston area are lower than required to maintain the present population, and more persons leave the area than enter. At the same time, new jobs have been filled by large numbers of women entering the workforce and by persons commuting longer distances from outside of the immediate Boston area. All of these trends are expected to continue.

With more of the existing population expected to continue to join the workforce, demand for transit service may become more focused on peak-period service for work trips, with a lessening demand on mid-day service for non-work trips. In addition, with new jobs being created in downtown Boston and the suburban areas of the SOUTHBus area, new demand will likely be for service from the Boston neighborhoods to downtown Boston and southward towards Route 128. The existing SOUTHBus network has been primarily designed to serve the downtown Boston trips, but not the trips to areas along or beyond Route 128 (with the exception of trips to locations along Washington Street on Route 34E to Walpole).

### Socio-Economic Characteristics

The SOUTHBus corridor, in many respects, consists of two subareas: the Boston neighborhoods and the suburban towns. In general, the Boston neighborhoods are less affluent, more transit-dependent, and have an older population than the suburbs. The one exception is West Roxbury, which, in terms of income and development, is more similar to the suburbs than to the other Boston neighborhoods.

Unemployment is low throughout the corridor, ranging from below two percent in Westwood to between four and five percent in Boston. Incomes

are higher in the suburbs than in Boston. In 1980, according to the US Census, average household incomes ranged from \$12,200 (in South Dorchester) to \$18,300 (in West Roxbury) in the Boston neighborhoods. In the suburban towns, average household incomes exceeded \$20,000 in all towns, ranging from \$21,800 in Norwood to \$32,100 in the southern part of Brookline served by Route 51.

Residents of the Boston neighborhoods are also more dependent on the MBTA than are residents of the suburbs. In Hyde Park, Mattapan, Roslindale, South Dorchester and West Roxbury, from 15 percent to 34 percent of all households do not have access to a car, while in Brookline, Dedham, Norwood, Walpole, and Westwood, only five to ten percent do not have access to a car.

Patterns of average household income and auto ownership are closely correlated throughout the corridor, with levels of auto ownership dropping as income levels decrease. At the same time, many of the Boston residents likely choose not to have a car due to the amount of transit service available, not because of economic necessity. In the suburban towns, by contrast, there is little transit service available, so that transit is not a viable alternative for most trips. However, in total, including those that cannot afford a car or cannot drive for other reasons, as well as those that choose not to own a car, approximately 64,000 residents of the SOUTHBus corridor do not have access to an automobile.<sup>2</sup>

Fourteen percent, or 42,150 of the SOUTHBus corridor's residents, are aged 65 or older; most of these elderly residents (33,140) live in the Boston neighborhoods. By area, elderly populations range from eight to 13 percent in the suburbs, to seven to 22 percent in Boston. For all SOUTHBus routes, 13 percent of all riders, or 4,025 daily riders, are 65 or older (see Table 2-1), meaning that on any given weekday, approximately five percent of the elderly population is served. This is essentially the same market penetration that bus service achieves for all age groups in this corridor, indicating that SOUTHBus area elderly residents are not any more transit-dependent than the population as a whole. SOUTHBus routes also carry a relatively low percentage of riders younger than 18. In the corridor, while 19 to 32 percent of each neighborhood or town's population is in this age group, only 13 percent of SOUTHBus riders are younger than 18.

---

<sup>2</sup>Based on an average of 2.7 residents per household. Also, this figure includes only households where none of the residents have access to an car. It does not include households where at least one car is available, but not to all members of the household.

**Table 2-1**  
**Socio-Economic Characteristics of SOUTHBus Riders**  
**(Weekday Service)**

	<u>Age</u>		<u>% w/o</u>	<u>% with</u>
	<u>Younger</u>	<u>65 and</u>	<u>Auto</u>	<u>Income less</u>
	<u>than 18</u>	<u>Older</u>	<u>Avail.</u>	<u>than \$15,000</u>
Route 24	31.3%	14.6%	83.3%	49.1%
Route 27	17.6%	14.7%	84.7%	57.9%
Route 30	12.2%	5.7%	81.2%	38.4%
Route 32	10.0%	9.4%	76.3%	37.5%
Route 33	22.1%	19.1%	86.7%	57.1%
Route 34	11.5%	14.2%	71.4%	37.6%
Route 35	6.6%	14.0%	72.3%	35.0%
Route 36	7.8%	13.0%	72.3%	30.4%
Route 37	14.9%	13.0%	66.2%	25.5%
Route 38	18.7%	13.7%	64.4%	15.5%
Route 40	8.2%	25.0%	72.6%	56.5%
Route 50	15.1%	15.9%	72.4%	35.9%
Route 51	<u>18.7%</u>	<u>16.7%</u>	<u>68.9%</u>	<u>31.3%</u>
Average	12.9%	13.4%	74.0%	37.3%

Based on household income levels and automobile unavailability rates of SOUTHBus riders, a large percentage appear to be transit-dependent. For all SOUTHBus routes combined, 37 percent of all riders are from households with an annual income of \$15,000 or less, and 74 percent do not have a car available for their trip. However, those persons without a car available that use SOUTHBus routes represent less than 15 percent of the area's total carless households. The remainder either uses the rapid transit system, walks, carpools, or employs other means.

### EXISTING TRANSPORTATION USE/PATTERNS

In 1980, SOUTHBus area residents made 262,040 one-way work trips (trips to and from work) per weekday. The largest numbers of these trips are to downtown Boston, the Boston neighborhood or town in which they live, the Fenway/Parker Hill area, Roxbury, and the South End. As would be expected, and as shown in Table 2-2, there is much more of a focus towards downtown Boston from within the Boston neighborhoods, and more of a focus towards travel within the same town in the suburban areas.



Table 2-2  
Distribution of Work Trip Locations  
for Study Area Residents

Town/Area of Residence	Employed Residents	Work Location													
		Home Town/ Home Area	Downtown Boston	Fenway/ Parker Hill	Roxbury	South End	South Dorchester	Other							
BOSTON															
Hyde Park	14,740	1,620	11.0%	4,035	27.4%	825	5.6%	470	3.2%	360	2.4%	425	2.9%	7,005	47.5%
Jamaica Plain	15,590	1,490	9.6%	4,100	26.3%	2,000	12.8%	500	3.2%	525	3.4%	205	1.3%	6,770	43.4%
Mattapan	8,260	375	4.5%	2,555	30.9%	440	5.3%	590	7.1%	270	3.3%	400	4.8%	3,630	43.9%
Roslindale	12,240	755	6.2%	3,105	25.4%	1,145	9.4%	305	2.5%	225	1.8%	185	1.5%	6,520	53.3%
South Dorchester	24,200	2,810	11.6%	7,165	29.6%	1,570	6.5%	940	3.9%	835	3.5%	**	**	10,880	45.0%
West Roxbury	13,460	1,385	10.3%	3,250	24.1%	915	6.8%	325	2.4%	290	2.2%	220	1.6%	7,075	52.6%
Subtotal	88,490	8,435	9.5%	24,210	27.4%	6,895	7.8%	3,130	3.5%	2,505	2.8%	1,435	1.6%	41,880	47.3%
BROOKLINE															
South Brookline	4,380	214	4.9%	895	20.4%	420	9.6%	80	1.8%	65	1.5%	30	0.7%	2,676	61.1%
DEDHAM	8,110	2,075	25.6%	970	12.0%	160	2.0%	145	1.8%	85	1.0%	60	0.7%	4,615	56.9%
NORWOOD	14,860	4,980	33.5%	1,285	8.6%	265	1.8%	100	0.7%	115	0.8%	95	0.6%	8,020	54.0%
WALPOLE	8,960	2,535	28.3%	465	5.2%	100	1.1%	75	0.8%	60	0.7%	55	0.6%	5,670	63.3%
WESTWOOD	6,220	810	13.0%	1,080	17.4%	200	3.2%	80	1.3%	45	0.7%	95	1.5%	3,910	62.9%
	131,020	19,049	14.5%	28,905	22.1%	8,040	6.1%	3,610	2.8%	2,875	2.2%	1,770	1.4%	66,771	51.0%

\* Source: 1980 U.S. Census

\*\* Included under "Home Town/Home Area."

In the Boston neighborhoods, from 24 to 31 percent of all work trips are to downtown Boston. Most of these trips are to the Financial District, Government Center, or Back Bay, followed by fewer trips to Beacon Hill and Park Square. An average of ten percent are made within the same neighborhood, and eight percent are made to the Fenway/Parker Hill area. The remaining trips are scattered throughout the region. In the suburbs, an average of only 11 percent of all work trips are to downtown Boston. Most trips are made within the same town (up to 34 percent) or to other areas scattered throughout the region (up to 63 percent).

Figure 2-1 displays the major travel patterns within the SOUTHBus area that are served by SOUTHBus routes more specifically.<sup>3</sup> Most demand from within the area is for travel to or from downtown Boston, followed by the Fenway/Parker Hill area. There is also a significant amount of travel within the SOUTHBus area between Jamaica Plain and Hyde Park, Roslindale, and West Roxbury, between West Roxbury and Roslindale, and between Hyde Park and South Dorchester. There is not a large degree of circumferential or crosstown work trip travel within or through the area.

Existing transit service in the SOUTHBus area reflects the travel patterns described above. Nearly all service is radial in nature and focuses on service to downtown. This includes commuter rail service from each of the suburban communities (except South Brookline, which is served by the Green Line), and direct commuter rail, rapid transit, and/or feeder bus service (the SOUTHBus routes) to the rapid transit system from the Boston neighborhoods. Existing bus services also match most of the heavily traveled local work trip paths. In addition, by providing access to the rapid transit system and to major bus terminals at Forest Hills, Mattapan and Ashmont, SOUTHBus routes provide good connections to most of the Boston area.

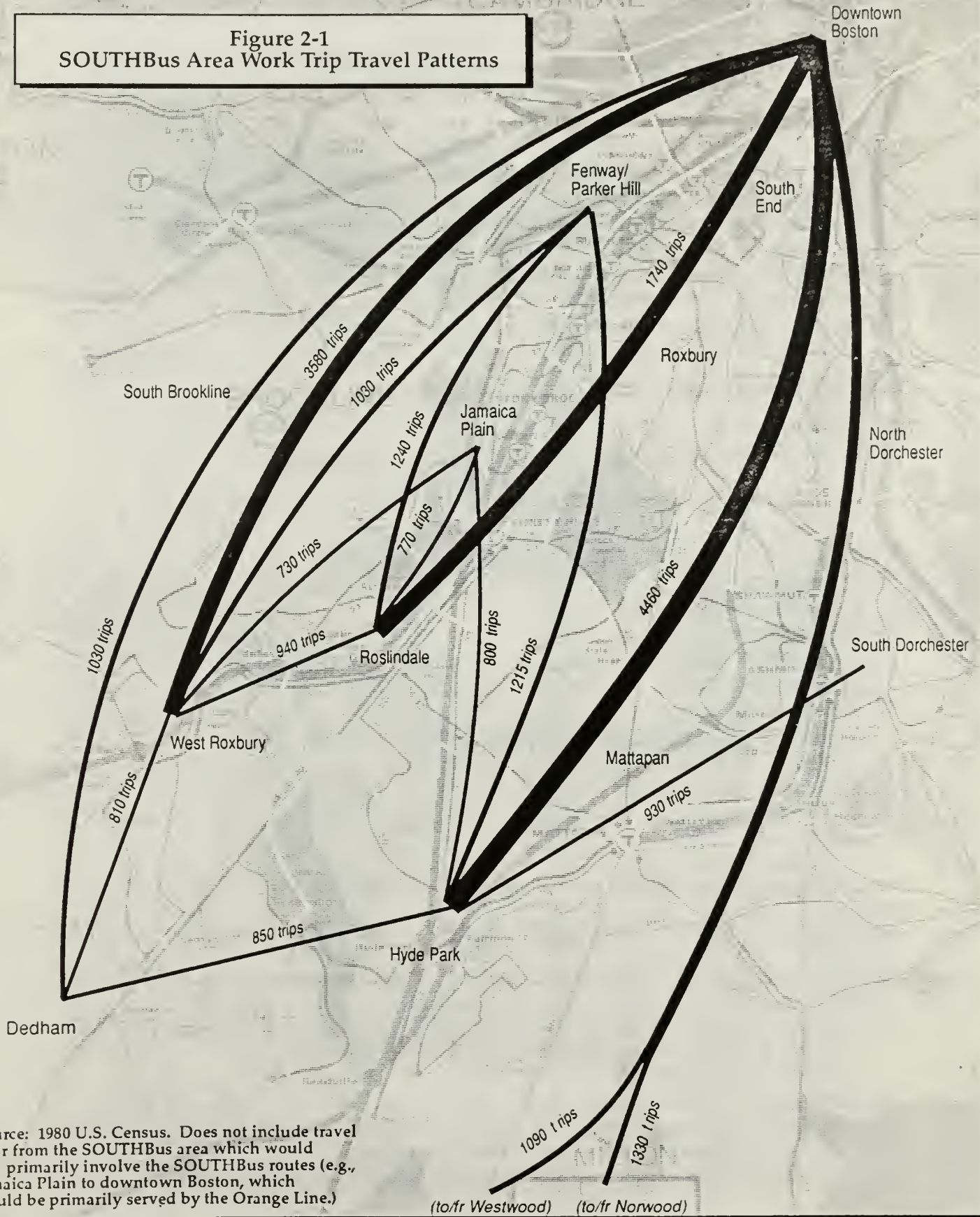
Of 104,010 daily unlinked transit trips made from the SOUTHBus corridor (see Table 2-3), 34,580 are made on SOUTHBus routes, 26,200 on the Orange Line to and from Forest Hills, 32,120 on the Red Line (including the Mattapan High Speed Line), and 10,415 on commuter rail. Approximately 17 percent of these trips (17,430) also involve transfers between SOUTHBus routes and the rapid transit system. In general, as the distance from downtown Boston increases, commuter rail carries a higher percentage of the downtown trips, while from the Boston neighborhoods, SOUTHBus routes and rapid transit carry more trips to downtown due to greater service coverage and higher service levels.

---

<sup>3</sup>Travel served by SOUTHBus routes refers to travel between areas in which one or more of the SOUTHBus routes would or could be used for most transit trips. Therefore, while high demand exists from other areas, such as from Jamaica Plain and South Dorchester to downtown, most of this travel would not involve SOUTHBus routes, and is not shown.



**Figure 2-1**  
**SOUTHBus Area Work Trip Travel Patterns**





**Table 2-3**  
**Bus, Rapid Transit and Commuter Rail Ridership from the SOUTHBus Corridor**

	<u>Total Bus</u>	<u>Orange Line<sup>4</sup></u>	<u>Red Line<sup>5</sup></u>	<u>Green Line<sup>5</sup></u>	<u>Commuter Rail</u>
<u><i>SOUTHBus Routes</i></u>					
Route 24	1,495		340		
Route 27	960		330		
Route 30	1,835	245	485		
Route 32	6,825	3,555			
Route 33	1,070		310		
Route 34	7,760	3,650			
Route 35	3,065	1,745			
Route 36	3,645	1,965			
Route 37	2,170	1,340			
Route 38	1,210	895			
Route 40	1,245	810			
Route 50	1,345	580			
Route 51	1,955	485		695	
<i>Subtotal</i>	<i>34,580</i>	<i>15,270</i>	<i>1,465</i>	<i>695</i>	
<u><i>Commuter Rail</i></u>					
Attleboro/Stoughton Line <sup>5</sup>					985
Fairmount Line <sup>6</sup>					855
Franklin Line <sup>7</sup>					6,170
Needham Line <sup>8</sup>					2,410
<i>Subtotal</i>					<i>10,415</i>
<u><i>Rapid Transit (other than transfers from SOUTHBus routes)</i></u>					
Forest Hills		10,930			
Ashmont			24,935		
Mattapan			5,050		
Butler			310		
Cedar Grove			360		
<i>Subtotal</i>			<i>30,655</i>		
<b>Total</b>	<b>34,580</b>	<b>26,200</b>	<b>32,120</b>	<b>695</b>	<b>10,415</b>

<sup>4</sup>Figures corresponding to bus routes indicate transfers.

<sup>5</sup>Hyde Park Station only.

<sup>6</sup>Readville and Morton stations.

<sup>7</sup>Walpole, Plimptonville, Windsor Gardens, Norwood Central, Norwood Depot, Islington, Endicott, and Readville stations.

<sup>8</sup>West Roxbury, Highland, Bellvue, and Roslindale Village stations.

Transit usage in the SOUTHBus area has increased as the result of two recent developments: the opening of the new Orange Line in May 1987, and the re-institution of commuter rail service on the Needham Line serving West Roxbury and Roslindale in October 1987. As of the Fall of 1987, MBTA pointchecks indicate that total ridership on routes connecting to the Orange Line has increased 17 percent, or 4,075 trips per day (see Table 2-4). Through February 1988, ridership to and from West Roxbury and Roslindale on the Needham Line has been approximately 2,410 one-way trips per day.<sup>9</sup> Although the re-institution of commuter rail service from West Roxbury and Roslindale would be expected to draw riders away from feeder bus service and the Orange Line, ridership on feeder bus routes from these areas has increased as well. On Routes 35, 36, 37, and 38, all of which serve West Roxbury, increases have actually exceeded those on other routes, at between 15 and 30 percent.

---

Table 2-4  
Ridership Increases to and from Forest Hills  
Spring 1986 to Fall 1987

	Spring 1986 <u>Ridership</u>	Fall 1987 <u>Ridership</u>	<u>Increase</u>
Route 32	5,450	6,825	+25%
Route 34	6,735	7,760	+15%
Route 35	2,355	3,065	+30%
Route 36	3,175	3,175	+15%
Route 37	1,785	2,170	+22%
Route 38	990	1,210	+22%
Route 40	1,180	1,245	+6%
Route 50	1,170	1,345	+15%
Route 51	<u>1,835</u>	<u>1,955</u>	<u>+7%</u>
Total	24,675	28,750	+17%

---

As is the nature of feeder bus services, a large majority of all SOUTHBus trips involve at least one transfer (see Table 2-5). However, most of these trips involve only one transfer, and less than five percent involve two or more transfers.<sup>10</sup> Most transfers take place with the rapid transit system at Forest Hills, Ashmont or Mattapan; some also take place at Cleveland Circle or

---

<sup>9</sup>The 2,410 commuter rail riders include approximately 340 ex-riders of Route 315 (Roslindale Square - Downtown Boston), which was discontinued when commuter rail service was restored.

<sup>10</sup>Not including transfers within the rapid transit system.

Table 2-5  
Transfer Characteristics of SOUTHBUS Riders  
(Weekdays)

	<u>Transfers</u>		% Ride ≥5 Days /Week.
	<u>To/Fr Rapid Transit</u>	<u>To/Fr Local Buses</u>	
Route 24	35.3%	26.3%	62.4%
Route 27	43.0%	34.4%	74.1%
Route 30	30.5%	59.5%	67.9%
Route 32	41.0%	35.0%	61.8%
Route 33	29.3%	36.7%	68.6%
Route 34	41.0%	26.3%	65.9%
Route 35	44.0%	25.2%	75.7%
Route 36	40.1%	26.1%	69.3%
Route 37	47.8%	27.0%	64.7%
Route 38	53.5%	27.2%	71.0%
Route 40	49.7%	27.4%	62.3%
Route 50	37.6%	31.4%	72.2%
Route 51	57.9%	28.8%	66.4%
Average	41.8%	31.1%	63.6%

Reservoir on the Green Line. In total, 42 percent of all SOUTHBUS trips involve a transfer of this type. In addition, 31 percent of all trips, or 7,650 daily trips involve transfers to other bus routes. By far the largest number of bus transfers occurs with Route 39 at Forest Hills, which has replaced the Arborway Line, where 3,250 daily transfers are made. For other transfers to or from outside of the SOUTHBUS area, significant numbers of transfers are also made with Route 21 (Forest Hills - Ashmont), Route 29 (Mattapan - Ruggles), and Route 63 (Cleveland Circle - Central Square, Cambridge). Daily transfers that are made among the SOUTHBUS routes total 1,800 per weekday.

### COMMUNITY CONCERNS

In July of 1988, the BTD held "transit service workshops" throughout the city to address public transit problems and needs of Boston residents. A number of issues were raised in those workshops, and the BTD made a number of



recommendations.<sup>11</sup> For the neighborhoods and bus routes included in the SOUTHBus area, these were as follows:

### Jamaica Plain

- Evaluate the need for increased crosstown service. Suggested destinations for more frequent service include American Legion Highway, Dudley Square, Brookline, Harvard Square, Cleveland Circle and the Chestnut Hill Mall.

### Mattapan

- Provide a direct bus connection between Mattapan Square and Forest Hills Station. Although Forest Hills is the Orange Line station closest to Mattapan Square, existing bus connections on Routes 28 and 29 serve Jackson Square and Ruggles Station. Residents expressed frustration with the lack of direct service to Forest Hills.
- Provide early morning bus service to Forest Hills. As currently scheduled, bus service does not start early enough to allow residents to reach downtown Orange Line destinations for jobs that start at 6:00 am.

### West Roxbury/Roslindale/Hyde Park

- Evaluate the need for increased evening and weekend bus service. Because of the relatively low population density in these neighborhoods, off-peak service is particularly infrequent. Routes that could benefit from extended service include Routes 36, 38, 50, and 51.
- Evaluate bus connections to the Centre Street commercial district and commuter rail stations. This would improve links with major community activity centers and with the rail network. It was suggested that reconfiguring local bus routes, especially Routes 36 and 38, would improve service coverage.
- Ensure that buses do not leave Forest Hills before passengers arriving on the Orange Line can board.

---

<sup>11</sup>Howard/Stein-Hudson Associates, Inc., for the Boston Transportation Department, Boston Neighborhood Transit Service Workshops, September 1988.

## LATENT DEMAND

MBTA service is designed to meet two major goals: to provide a basic level of mobility and to provide service that is an attractive alternative to the automobile. With few exceptions, transit service in the SOUTHBus corridor does serve both purposes. Bus, rapid transit or commuter rail service is provided within one-quarter mile of nearly all residents in the Boston neighborhoods, and major trip generators and attractors are served. However, most riders do not have a car available, indicating that the SOUTHBus routes are more successful at providing a basic level of mobility than encouraging people to shift to transit from automobiles.

For trips to and from downtown Boston, transit trips are significantly cheaper than automobile trips due to the high cost of parking in downtown Boston. However, slow bus running times, coupled with wait times and transfer times, result in trip times that are much longer than those by automobile. For example, from the outer ends of most routes, travel times for trips to downtown Boston involve 15 to 20 minutes of travel time on feeder bus service to Forest Hills, 17 minutes on the Orange Line (to Downtown Crossing), plus transfer and other wait time, resulting in 40 minutes or more of total travel time. Therefore, to make transit more attractive, either running times or wait times (including transfer time) would have to be reduced.

Since bus operating speeds are largely a result of the operating environment, and SOUTHBus routes are relatively direct, little can be done to significantly reduce bus running times. The re-institution of commuter rail service on the Needham Line has reduced transit travel times from West Roxbury and Roslindale by eight to ten minutes, and has been successful in attracting new riders. However, the shorter travel times only benefit those that walk or drive to the stations, since commuter rail and bus schedules are not coordinated. If commuter rail and bus schedules were coordinated, shorter overall travel times could be provided to downtown Boston for a greater number of potential riders. At present (Fall 1988), commuter rail operates during peak periods at 35 to 44 minute headways, and Routes 35, 36, and 37 operate at 10 to 20 minute headways. Therefore, it appears that some or most of these services could be coordinated with only relatively minor schedule changes. (This will be examined in more detail in the analysis of Routes 35, 36, and 37.)

In Hyde Park, Routes 24, 32, and 33 could be coordinated with commuter rail on the Attleboro/Stoughton, Walpole and Fairmount Lines. At present, trips to Boston via Routes 24 and 33 require two transfers—one with the Mattapan High Speed Line and one with the Red Line. Coordination of these two routes with commuter rail would reduce the number of transfers required to one, as well as reduce travel time. Route 24 could connect with commuter

rail at the Fairmount station by routing all trips via Dana Street. Many Route 33 trips already operate near the Readville Station on the Walpole Line; these trips, or all Route 33 trips, could be routed through the station to facilitate transfers. Route 32 service is frequent enough in peak periods so that schedule coordination would not be necessary. However, mid-day coordination could be improved. (Coordination of commuter rail service with these routes will be examined as part of the analysis of the specific routes.)

SOUTHBus service could also be made more attractive if fewer transfers were required to complete trips. In this respect, the following MBTA standards apply:<sup>12</sup>

- No more than 25 percent of customers using only surface vehicles should require more than one vehicle to complete their trips.
- Two routes with a common terminus and a transfer rate of 20 percent or more should be considered candidates for through-routing.
- Route extensions up to one mile should be implemented if the extension would eliminate a transfer for 20 percent or more of the route's riders.

When surveyed, 31 percent of all SOUTHBus trips, or 10,750 per day, involved transfers with another bus route; the largest number of transfers, 3,255 per day, were with Route 39. The largest percentage transfer rates to Route 39 were from Routes 32 and 34, where 15 and 14 percent of all riders transferred. A large number of transfers (up to 2,000 per day) could be eliminated by through-routing Route 32 and 34 trips with Route 39. (These connections will be examined as part of the analysis of Routes 32 and 34.)

On the routes operating to or through Mattapan, 24 percent of Route 24's riders, 15 percent of Route 30's riders, and 26 percent of Route 33's riders are traveling to or from downtown Boston. During the mid-day, Route 30 operates through Mattapan to Ashmont, and during the evening period, Route 24 operates through to Ashmont, providing direct connections to the Red Line. However, for most of the day, including peak periods, these riders must make two transfers: one at Mattapan to the Mattapan High Speed Line, and one at Ashmont to the Red Line. For these riders, connections could be greatly improved by operating more trips through to Ashmont, or by through-routing Route 24, 30, and/or 33 trips with Route 27, which operates between Mattapan and Ashmont. (These connections will be addressed as part of the analysis of Routes 24, 27, 30, and 33.)

---

<sup>12</sup>MBTA, Service Policy for Surface Public Transportation, August 5, 1977.



The number of transfers between other routes is not large enough to justify combining or through-routing routes to eliminate transfers altogether. However, the amount of time involved in transferring could be reduced by creating timed transfer points and better coordinating schedules. In the SOUTHBus corridor, potential locations for timed transfer points are Forest Hills and Mattapan. At Roslindale Square, traffic conditions would not allow buses to be held to expedite transfers, but schedule coordination could be improved. Schedule coordination could have the greatest impact when routes with long headways are coordinated. In the SOUTHBus corridor, ten of thirteen routes have headways in one or both peak periods of 20 minutes or more, and 11 have base headways of 20 minutes or more. These routes include four route combinations with 50 or more transfers per day (see Table 2-6). (The possible coordination of these routes, as well as timed transfer points, will be addressed in an analysis of coordination possibilities throughout the corridor.)

---

**Table 2-6**  
**Service to Consider for Coordinated Scheduling**

	<u>Peak Periods</u>	<u>Mid-day</u>	<u>Weekday Transfers</u>
Routes 24 & 27	x	x	75
Routes 27 & 30	x	x	80
Routes 30 & 35	x	x	70
Routes 30 & 36		x	80

---

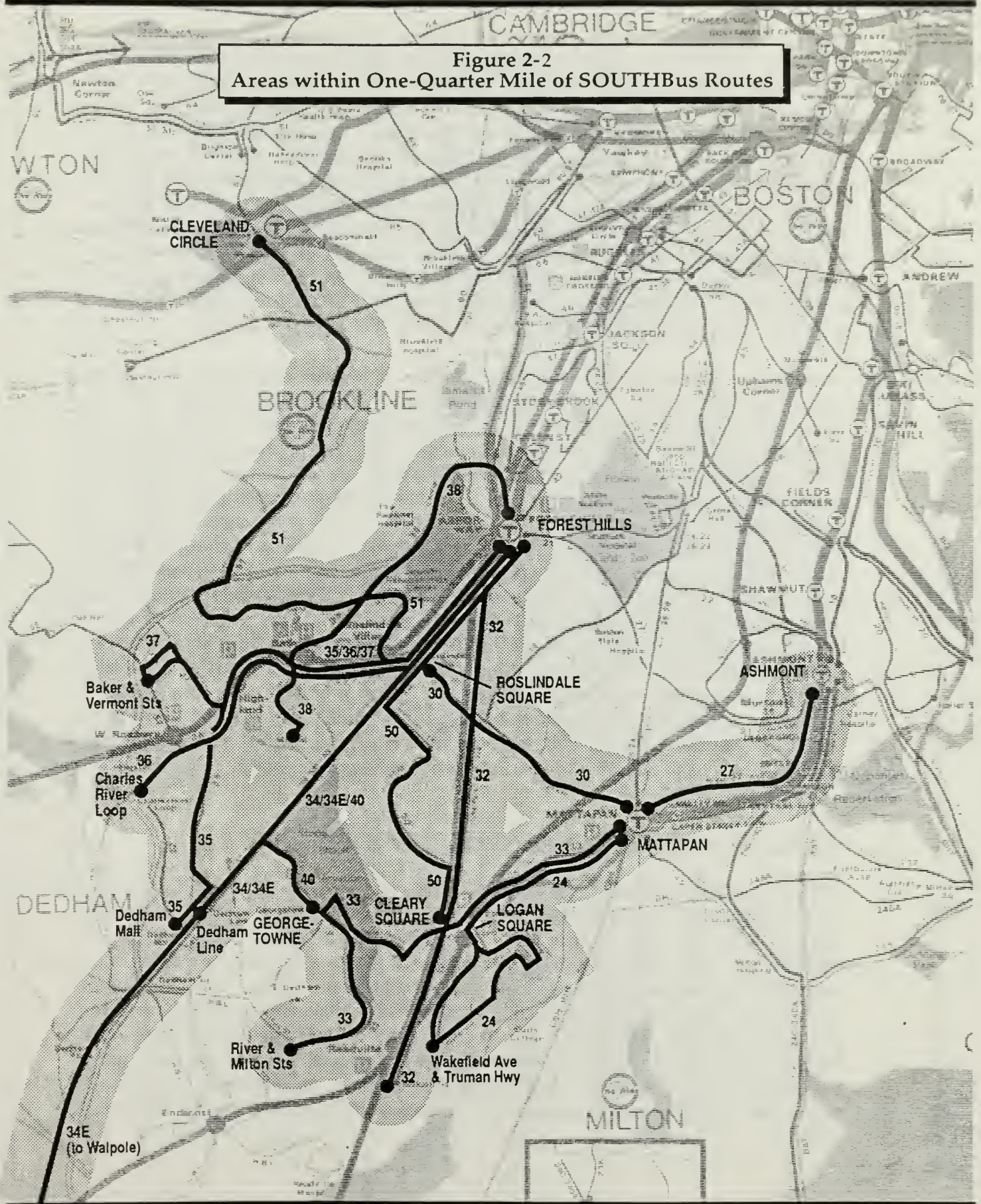
The most costly way to reduce transfers would be to implement new routes or extend existing routes. New or extended routes could generate new ridership to the extent that new markets would be served or better service could be provided. However, in the SOUTHBus area, transit service is already provided within walking distance of nearly all residents in all areas where it is practical, and direct service is provided between most major trip attractors and generators.

In the Boston neighborhoods served by the SOUTHBus routes, with few exceptions, transit service is provided within one-quarter mile of nearly every resident (see Figure 2-3). Further, most residents in these areas have access to more than one mode. Along the northern edge of the corridor, there is direct access to the Orange and Red Lines, while most residents in the rest of the corridor are served by commuter rail and bus service.

In the suburban towns, with the exception of service to the Dedham Mall and the Dedham Line on Route 33, the only MBTA bus service is provided by



**Figure 2-2**  
**Areas within One-Quarter Mile of SOUTHBus Routes**





Route 34E between Walpole Center and Forest Hills along Washington Street. However, Dedham, Westwood, Norwood, and Walpole are also served by the commuter rail system which provides service to downtown Boston and connections to the rapid transit system. Other than Route 34E, no other MBTA local service is provided in Dedham, Westwood, Norwood, or Walpole. Due to the scattered nature of residential and business development in these towns, it would be difficult, if not impossible, for the MBTA to serve local trips at a reasonable cost, and there are no plans for the MBTA to attempt to do so. However, one local route is provided in Dedham by Hudson Bus Lines that is partially funded by the MBTA through its suburban bus program. This route operates between the Charles River Loop near the VA Hospital and Sprague Street in Dedham via East Dedham, Oakdale, Ashcroft, and Endicott Streets.

In addition to transit services being nearby, it is also important that those transit services serve major travel patterns. In the SOUTHBus area, to determine how well transit services matched existing travel patterns, areas between which 500 or more one-way work trips were made were reviewed with respect to the availability of transit service. As shown in the summary of this review in Table 2-7, good transit connections are possible to and from nearly all sections of the Boston neighborhoods. Exceptions are trips to and from the Fenway/Parker Hill area from most all neighborhoods except Jamaica Plain, where two transfers are necessary for all trips except those made within walking distance of Brigham Circle (which can be accessed with only one transfer through Forest Hills via Route 39). For trips from areas where two transfers are necessary, the transit mode split ranges from only 23 to 35 percent. This transit share is significantly lower than from the same areas to other sections of Boston, where the transit mode split for work trips is as high as 72 percent. To improve service for these trips, new service could be instituted between Forest Hills and Kenmore Square, essentially connecting the outer end of Route 39 and the inner end of Routes 60 or 65.

### IMPACT OF NEW DEVELOPMENT IN THE SOUTHBus AREA

Within the SOUTHBus corridor, since 1986, nearly all large new residential and commercial development has occurred and will continue to occur around and beyond Route 128. The Boston neighborhoods are well established, and most ongoing development is of a small scale involving renovation of existing facilities (less than 10,000 square feet). In conjunction with these development patterns, nearly all of the employment increases projected for the area will also occur around and beyond Route 128. Employment in the Boston neighborhoods is expected to remain essentially the same, at least through 1995, while employment in Dedham, Westwood, Norwood, and Walpole is expected to increase 16 percent between 1985 and 1995.



Table 2-7  
Transit Connections Between Major Work Trip Interchanges

Rank	Interchange	# One Way Work Trips	Transit Connections	Comments
1	South Dorchester to Financial District	2110	Red Line and commuter rail to South Station.	Direct connection via rapid transit; high transit mode split (68%). Does not involve SOUTHBus routes.
2	Jamaica Plain to Fenway/Parker Hill	2000	via Orange Line to Green Line, or Route 39 to Longwood Medical Center	Most travel does not involve SOUTHBus routes; fairly high transit mode split of 43%.
3	South Dorchester to Government Center	1810	via Red Line direct or Red Line to Green or Orange Lines.	High transit mode split of 67%. Does not involve SOUTHBus routes.
4	South Dorchester to Fenway/Parker Hill	1570	via Red Line to Green Line; no direct service.	Transit mode split of 35% relatively low for travel within Boston. Does not involve SOUTHBus routes.
5	South Dorchester to Back Bay	1540	via Red Line to Green Line; no direct service.	Transit mode split of 50% fairly high. Does not involve SOUTHBus routes.
6	Walpole to Norwood	1360	Route 34E	Service only available along Washington Street. Transit mode split of 2%.
7	Jamaica Plain to Financial District	1300	Orange Line direct, or Routes 16, 21, 32, 33, 34, 35, 36, 38, 40, 39, 40, 41, 42, 48, 50 or 51 to Orange Line, or Route 39 to Green Line.	Many transit alternatives, very high transit mode split of 72%. Most travel does not involve SOUTHBus routes.

Table 2-7 (Cont.)  
Transit Connections Between Major Work Trip Interchanges

Rank	Interchange	# One Way Work Trips	Transit Connections	Comments
8	Hyde Park to Financial District	1150	Route 32 or 50 to Orange Line, or Routes 24 or 33 to Mattapan High Speed Line (or direct service to Red Line on some Route 24 and 33 trips), or commuter rail to South Station.	One transfer and long travel times often involved, but many transit alternatives and high transit mode split of 65%.
9	Roslindale to Fenway/Parker Hill	1145	Routes 34, 35, 36, 37, 38, 40 or 51 to Route 39 to Green Line, or to Orange Line to Green Line.	Two transfers required to most trips; low transit mode split (23%).
10	South Dorchester to North Dorchester	1090	Red Line, Routes 18, 22, 23.	Most travel does not involve SOUTHBus routes, but low transit mode split of 19%. Does not involve SOUTHBus routes.
11	West Roxbury to Government Center	1070	Routes 35, 36, 37, 38 and 51 to Forest Hills to Orange Line, or commuter rail to South Station.	High level of service along Centre St.; high transit mode split of 63%.
12	Hyde Park to Government Center	1055	Route 32 to Route 39 or to Orange Line, or commuter rail to South Station.	Very high level of service on Routes 32 and 39; high transit mode split of 61%.
13	Jamaica Plain to Back Bay	990	Orange Line or Route 39 direct, or Routes 16, 21, 32, 33, 34, 35, 36, 38, 40, 39, 40, 41, 42, 48, 50 or 51 to Orange Line.	Many transit alternatives, fairly high transit mode split of 44%. Most travel does not involve SOUTHBus routes.
14	Norwood to Dedham	950	Route 34E	Service available only along Washington St. Transit mode split of 10% high for suburban areas.

Table 2-7 (Cont.)  
Transit Connections Between Major Work Trip Interchanges

Rank	Interchange	# One Way Work Trips	Transit Connections	Comments
15	Roslindale to Financial District	945	Routes 34, 35, 36, 37, 38, 40 or 51 to Orange Line.	High level of bus service to Forest Hills; high transit mode split (69%).
16	South Dorchester to Roxbury	940	Routes 22 and 23	Moderate transit mode split of 36%. Does not involve SOUTHBus routes.
17	Jamaica Plain to Government Center	930	Orange Line direct, or Routes 16, 21, 32, 33, 34, 35, 36, 38, 40, 39, 40, 41, 42, 48, 50 or 51 to Orange Line, or Route 39 to Green Line.	Many transit alternatives, high transit mode split of 72%. Most travel does not involve SOUTHBus routes.
18	West Roxbury to Fenway/Parker Hill	915	Routes 34, 35, 36, or 38 to Route 39, or Orange Line to Green Line.	Two transfers required for most trips (all except to Longwood Medical Area via Route 39). Fairly low transit mode split of 23%.
19	South Dorchester to Beacon Hill	875	Red Line.	Most of Beacon Hill within walking distance of Red Line, with fairly high transit mode split for Boston travel of 53%. Does not involve SOUTHBus routes.
20	West Roxbury to Government Center	865	Routes 35, 36, 37 or 38 to Orange Line.	High level of bus service along Centre Street; high transit mode split of 63%.
21	Mattapan to Financial District	835	via Mattapan High Speed Line or Route 27 to Red Line, Red Line direct, or commuter rail from Morton St.	High transit mode split, considering existing services, at 58%.



Table 2-7 (Cont.)  
Transit Connections Between Major Work Trip Interchanges

Rank	Interchange	# One Way Work Trips	Transit Connections	Comments
21	South Dorchester to Park Square	835	Red Line to Green or Orange Line.	Transit mode split of 60%.
21	South Dorchester to South End	835	Red Line to Orange Line.	Relatively low transit mode split of 27%.
24	Hyde Park to Fenway/Parker Hill	825	Route 32 to Route 39 to Green Line.	One transfer to Longwood Medical Area, two transfers to rest of area. Relatively low transit mode split of 21%.
25	Norwood to Walpole	765	Route 34E.	Some of this travel directly served by Route 34E, otherwise suburban travel that is not focused upon any concentrated area. Transit mode of 7%.
26	Roslindale to Back Bay	760	Routes 34, 35, 36, 37, 38, 40 or 51 to Orange Line.	High level of bus service; moderate level of transit use (34%).
27	Hyde Park to Back Bay	730	Route 32 to Route 39 or to Orange Line, or commuter rail to Back Bay Station.	Very high level of service on Routes 32 and 39 plus commuter rail now operates directly to Back Bay Station. Transit mode split of 33%.
28	Roslindale to Government Center	700	Route 34, 35, 36, 37, 38, 40, or 51 to Orange Line.	Good bus connection to Forest Hills; high transit mode split (73%).
29	Roslindale to West Roxbury	640	Routes 35, 36, and 37.	Direct service along Belgrade Ave and Centre St. Fairly low transit mode split of 14%, probably due to short distances involved.

Table 2-7 (Cont.)  
Transit Connections Between Major Work Trip Interchanges

Rank	Interchange	# One Way Work Trips	Transit Connections	Comments
30	Hyde Park to Dedham	615	Route 50 to Route 34.	Very indirect service; transit mode split of 11%.
31	Roslindale to Jamaica Plain	595	Routes 34, 35, 36, 37, 38, 40, and 51 direct.	Very high level of bus service, but only moderate level of transit use (23%), probably due to short distances involved.
32	Mattapan to Roxbury	590	Routes 28 and 29 direct, or via transfers to 16, 21, 22.	Fairly high level of bus service, but low level of transit use (8%).
33	West Roxbury to Back Bay	585	Routes 35, 36, 37, 38, and 51 to Orange Line or Route 39, or commuter rail direct to Back Bay Station.	High level of service along Centre Street, moderate transit mode split to Back Bay of 36%.
34	Westwood to Norwood	570	Route 34E.	Service only available along Washington Street. Transit mode split of 3%.
34	Hyde Park to Jamaica Plain	570	Route 32 or 50 direct.	Good bus connections and high level of service on Route 32; transit mode split of 25%.
36	West Roxbury to Jamaica Plain	555	Routes 35, 36, 37, 38, and 51 direct.	High level of service along Centre St., but low transit mode split of 4%, probably due to short distance involved.

Table 2-7 (Cont.)  
Transit Connections Between Major Work Trip Interchanges

Rank	Interchange	# One Way Work Trips	Transit Connections	Comments
37	West Roxbury to Dedham	550	Direct service to Dedham Mall on Routes 35 and 52. Other service requires transfer from Route 35 to Route 34.	Service to Dedham beyond Dedham Mall only along Washington St; transit mode split of 11%.
38	Jamaica Plain to South End	525	Orange Line direct.	Transit mode split of 35%.
39	South Dorchester to Hyde Park	510	Mattapan High Speed Line or Route 27 to Route 24 or 33.	Some Route 27 trips through-routed with Route 24 and 33 trips providing some direct service. Transit mode split is 27%.
40	Hyde Park to Beacon Hill	505	Route 32 or 50 to Orange Line, or Routes 24 or 33 to Mattapan High Speed Line (or direct service to Red Line on some Route 24 and 33 trips), or commuter rail to South Station.	One transfer and long travel times often involved, but many transit alternatives; moderate transit mode split of 39%.
41	Jamaica Plain to Roxbury	500	Orange Line or Route 42.	Good connections, but transit mode split of only 13%. Most travel does not involve SOUTHBus routes.



However, although large employment increases are projected in the suburbs, most new development and employment will continue to be spread throughout the towns and will not be well served by transit. Most of this development is occurring well away from Washington Street, which is the only area serviced by a SOUTHBus route (Route 34E), and away from commuter rail stations.

In Dedham, Walpole and Westwood, recent development has been mostly housing. In Norwood, the major emphasis has been on office space, although a few large condominium and single family housing developments have been or are being constructed. In Dedham and Westwood, residential development consists of single family homes, with most projects ranging in size from five to 20 units. Walpole has the largest number of residential developments, with seven projects ranging in size from 18 to 373 units, planned or completed since 1987. In Norwood the main development focus is on large commercial projects. These projects are mainly office or distribution space, and most are 100,000 square feet or larger. Most of these developments are clustered along Route 1, towards the southern edge of town. This part of Norwood represents the only part of the SOUTHBus area where development has been concentrated in a small area. This area is not presently served by transit, but could be served by a deviation of Route 34E off of Washington Street. However, a deviation of this sort would add approximately 1.5 miles to the route.

As with Norwood, nearly all other development in the SOUTHBus suburbs is occurring in areas that are not served by transit and that cannot be efficiently served by the MBTA. As a result, transit will not serve many of these new jobs, but will continue its traditional role of providing service to downtown Boston (via the commuter rail) and providing local service and connections to the rapid transit system to those in the vicinity of Washington Street via Route 34E. However, this market appears stable, and as downtown Boston continues to grow, this market should also continue to grow.

In the Boston neighborhoods, while significant development is not anticipated, more existing residents of these areas are expected to enter the work force. These residents will be traveling to new jobs that are created in the suburban sections of the SOUTHBus area, downtown Boston, or elsewhere. Transit service in the SOUTHBus corridor is well suited to serve the trips to Boston, but not trips to the suburbs. As a result, barring a significant expansion of service, the focus of transit in the Boston neighborhoods will continue to be towards downtown Boston.

## SUMMARY/OUTLOOK

Most of the transit service in the SOUTHBus corridor serves the Boston neighborhoods of Hyde Park, Mattapan, Roslindale, West Roxbury, and the southern end of Dorchester. These neighborhoods are well established and little new development is occurring. The existing transit network provides service within walking distance of nearly all residents, including direct service to most major locations within the corridor and feeder service to the rapid transit system for trips to Boston.

The suburban towns of Dedham, Westwood, Norwood, and Walpole are also well established, but are still experiencing some growth. However, as is typical in the suburbs, most of this growth is occurring in scattered locations throughout the towns and cannot be effectively served by transit. As a result, the major market served from these towns will continue to be that for trips to downtown Boston.

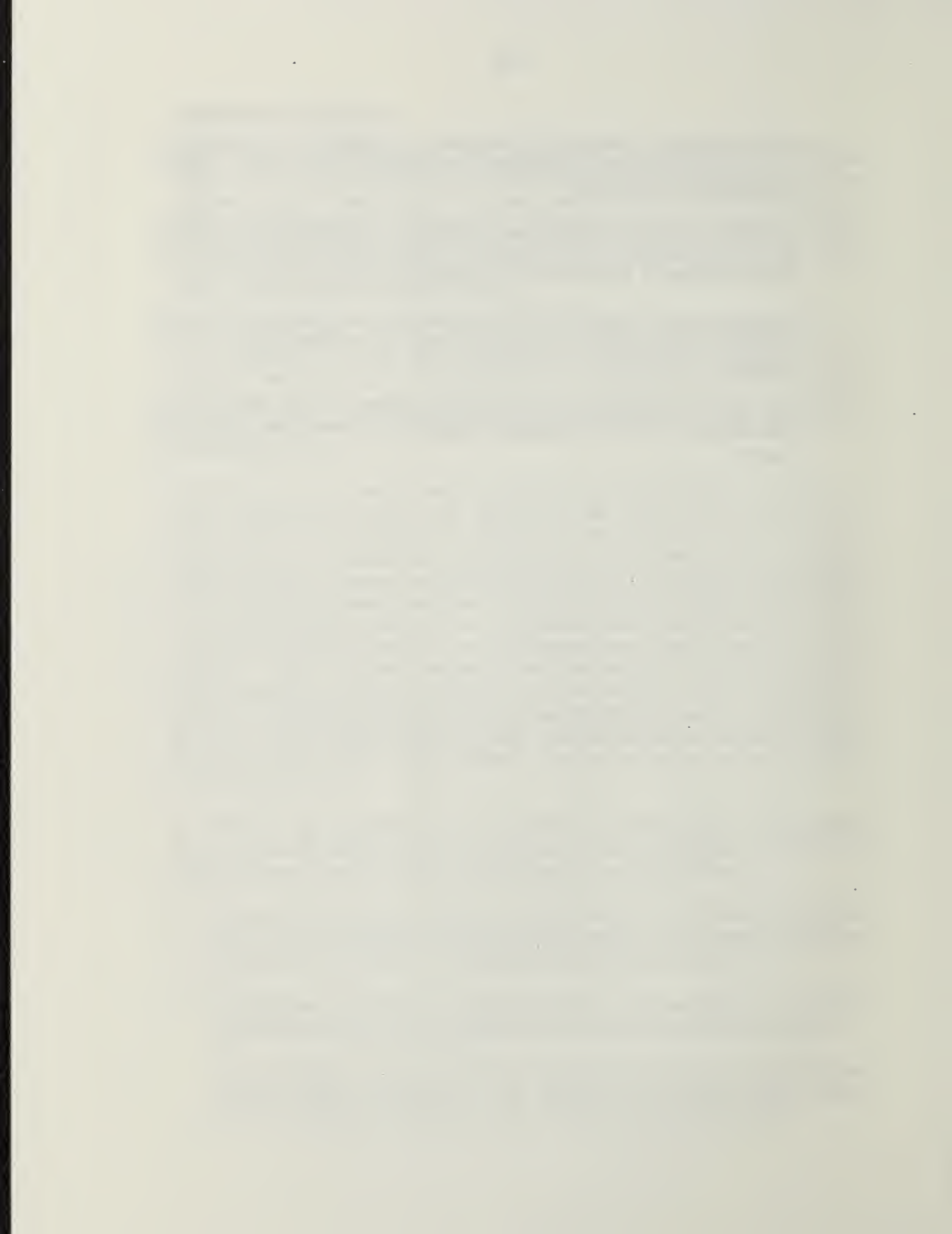
Over the past two years, transit ridership in the SOUTHBus corridor has grown significantly due to the opening of the new Orange Line, the re-introduction of commuter rail service on the Needham Line, and other improvements to commuter rail service. Bus ridership has increased approximately 17 percent, or 4,075 trips per day, and commuter rail ridership on the Needham Line at stations in West Roxbury and Roslindale is now approximately 2,410 trips per day, compared to 340 on old Route 315. On the Attleboro/Stoughton, Franklin and Fairmount lines, total ridership is up 36 percent. Most of these increases are the result of significant service improvements, so that increases of this magnitude are not expected to continue indefinitely. However, the downtown Boston market is expected to continue to grow, and more SOUTHBus area residents are expected to enter the workforce. Due to these factors, small to moderate increases should continue to occur.

In addition to increases due to growth in employment, bus service improvements could also attract new riders as well as improve the system for existing riders. These types of improvements are as listed below:

- Improved crosstown service in West Roxbury, Roslindale and Hyde Park. (This is addressed as part of the analysis of all existing routes and potential new routes that could provide crosstown service.)
- Additional evening and weekend service in West Roxbury. (This is addressed as part of the analysis of each of the West Roxbury routes.)
- An extension of Route 30 from Roslindale Square to Forest Hills to provide direct connections to the Orange Line for users of this route. (This extension is examined as part of the analysis of Route 30.)

- Holding buses at Forest Hills, Mattapan, and Ashmont when necessary to prevent buses from departing just as trains are arriving. (This is addressed in Chapter 14.)
- Improved coordination between SOUTHBus routes and commuter rail service, particularly in West Roxbury, Roslindale, and Hyde Park. (This issue is addressed in the analyses of Routes 24, 33, 35, 36, and 37.)
- Through-routing Route 32 trips with Route 39 to eliminate up to 2,000 transfers per day. (These through-routings are examined as part of the analysis of Route 32.)
- Improved coordination of Routes 24, 27, 30, 35, 36, and 37 to reduce transfer times. (This is addressed as part of an analysis of each of those routes.)





---

### 3. Mattapan and Hyde Park Service

---

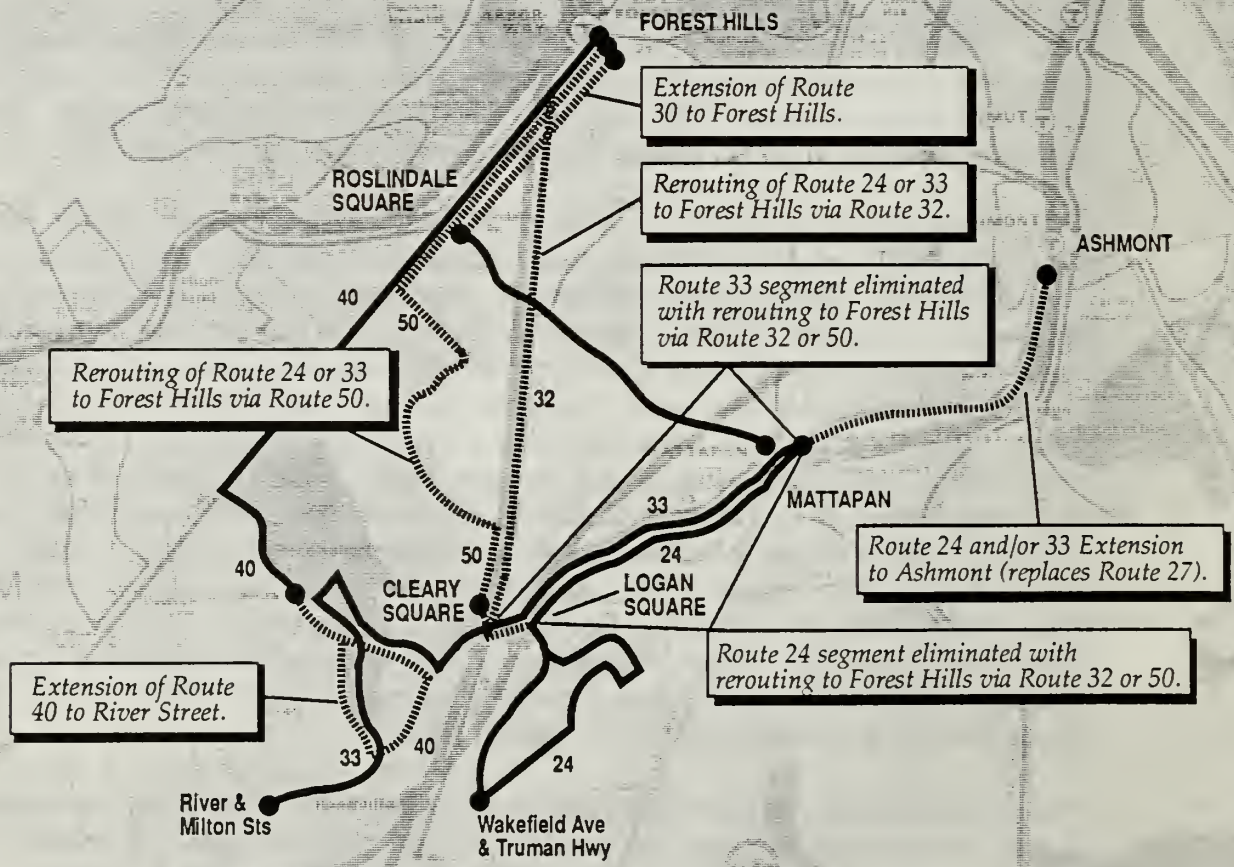
Hyde Park and Mattapan are served by seven routes: Routes 24, 27, 30, 32, 33, 40, and 50. Four of these routes (Routes 24, 27, 30, and 33) serve Mattapan. Routes 24 and 33 connect Hyde Park with Mattapan, while Route 30 connects Roslindale Square with Mattapan. Route 27 operates between Mattapan and Ashmont, serving primarily trips from Mattapan to Ashmont. Routes 32, 40, and 50 operate between Hyde Park and Forest Hills. However, these three routes serve a much smaller area of Hyde Park than do the others, so that most residents of Hyde Park must travel through Mattapan to travel to and from downtown Boston.

The Mattapan focus has a significant impact on downtown Boston-bound trips. Transit trips to downtown Boston through Mattapan take much more time than comparable trips through Forest Hills, especially to the Back Bay and Park Square areas. Trips through Mattapan also require two or three transfers, whereas trips on routes through Forest Hills require only one.

With the exception of Route 32 along Hyde Park Avenue, these routes serve predominantly residential areas, and most residents work outside of the immediate area. The largest numbers of work trips are made to downtown Boston (including the Back Bay and Park Square) and the Fenway/Parker Hill area. Since Forest Hills is a more convenient transfer point to those areas than Mattapan, Hyde Park would be better served if more service operated to Forest Hills. As further discussed in the following chapters, a number of alternatives for providing more Forest Hills service were examined, including rerouting Route 24 or Route 33 service to Forest Hills by combining the outer end of either of those routes with Route 32 or Route 50 service at Cleary Square (see Figure 3-1). Additional service could also be provided from Hyde Park by extending Route 40 past Georgetowne down to River Street near Readville. From the area of Mattapan between Mattapan Square and Roslindale Square, service to Forest Hills could be provided by extending Route 30 from Roslindale Square to Forest Hills.

In most cases, rerouting existing service to Forest Hills would not be feasible due to the adverse impacts the changes would have on existing riders that need to travel to Mattapan. In these cases, improved connections to downtown Boston could still be provided by extending bus service from

**Figure 3-1**  
**Options for Improving Service from**  
**Mattapan & Hyde Park to Downtown Boston**





Mattapan to Ashmont to eliminate the Mattapan transfer. Extensions of this type could be implemented on Routes 24, 30, and 33 (replacing Route 27 service).



---

## 4. Routes 24, 27 & 33

---

Route 24    *Wakefield Ave/Truman Highway - Mattapan or Ashmont*  
Route 27    *Mattapan - Ashmont*  
Route 33    *Dedham Line - Mattapan*

### ROUTE PROFILES

#### Route 24 Wakefield Ave/Truman Highway - Mattapan or Ashmont

Three variations of Route 24 operate between the Fairmount area of Hyde Park and Mattapan Station:

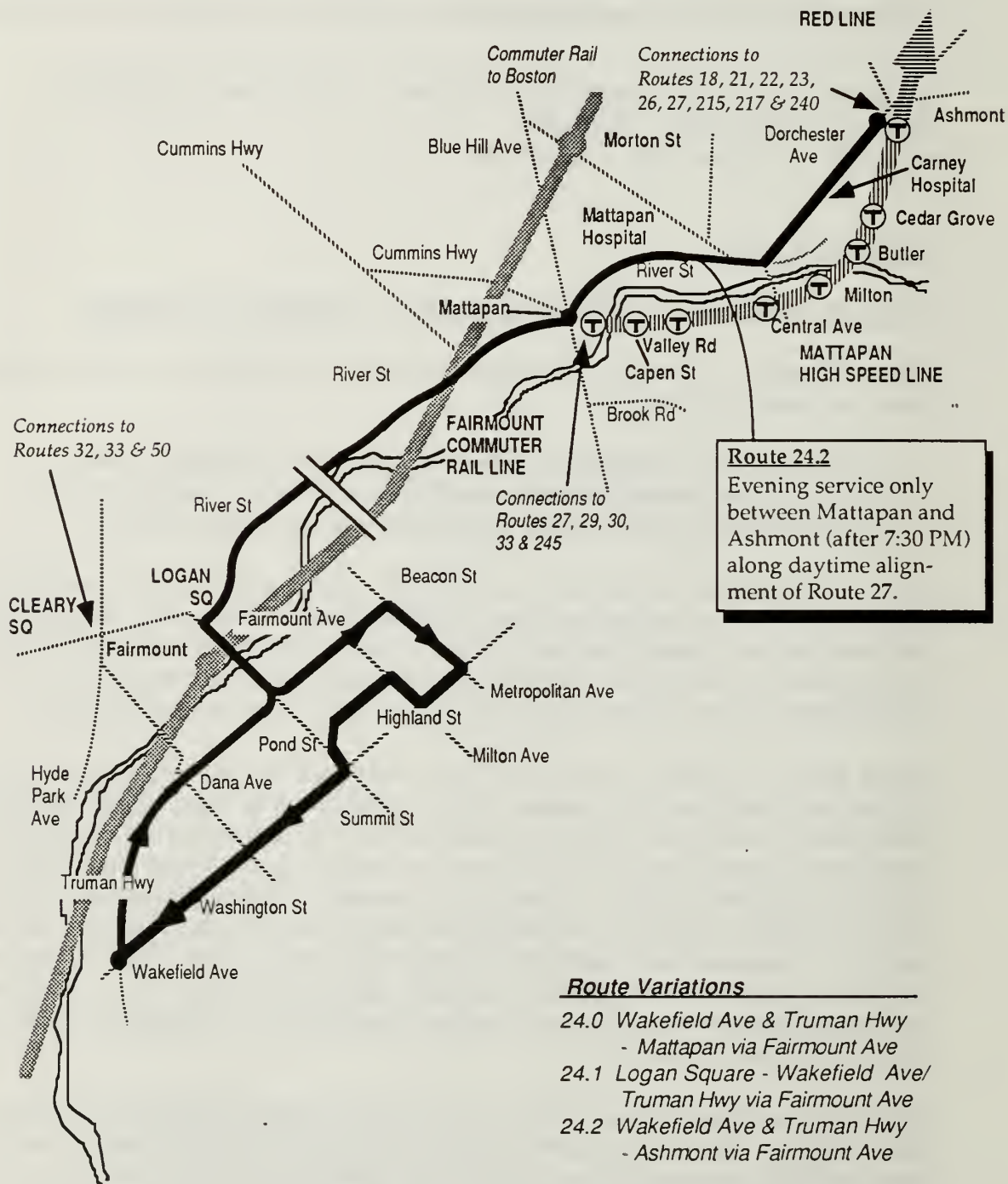
- 24.0 Wakefield Ave/Truman Hwy-Mattapan via Fairmount Ave
- 24.1 Logan Square-Wakefield Ave/Truman Hwy via Fairmount Ave
- 24.2 Wakefield Ave/Truman Hwy-Ashmont via Fairmount Ave

Route 24's primary function is to provide feeder service from residential areas of Hyde Park to the Red Line (via Mattapan or Ashmont). In addition, the route serves a large number of trips to and from Hyde Park High School. Connections can be made with commuter rail at the Fairmount Station on the Fairmount Line, and to Routes 29, 30, 33, and 245 at Mattapan Station.

Route 24.0 is the major variation of the route and operates throughout most of the day. Variation 24.1 consists of one outbound trip from Logan Square to Wakefield Avenue and Truman Highway that is scheduled for operational purposes (to get a Route 32.0 trip to the beginning of the line to become a Route 24.0 inbound trip). Variation 24.2 operates during the evening period along the same alignment as Route 24.0 except that it also provides service between Mattapan and Ashmont Stations (see Figure 4-1). The Ashmont - Mattapan service is designed to replace Route 27 (Ashmont - Mattapan) service during the evening and consists essentially of a through-routing of daytime Routes 24.0 and 27.

Service is provided between 5:44 am and 1:04 am with 20 minute headways in the AM peak, 30 to 50 minutes during the mid-day, 25 minutes in the PM peak, and 60 minutes in the evening (see Table 4-1). Total ridership on the four variations in the Spring of 1986 was 1,060 trips per day (see Table 4-2). However, approximately 70 of these trips are attributable to the Route 27





**Table 4-1**  
**Route 24 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1987): 5:44 am - 1:04 am

	Average	One-	Avg Headway (Mins-Peak Dir)					All Day	
	One-Way	Way							
	Length	Trips	AM	Base	Sch	PM	Eve	VSM	VSH
<i>Spring 1986</i>									
Rt 24.0	3.5	41	20	3T <sup>13</sup>	3T	24	23	141.5	15.1
Rt 24.1	3.9	1	1T	--	--	--	--	2.0	0.2
Rt 24.2	5.6	12	--	--	--	--	60	67.2	6.0
Rt 24.3	2.9	<u>16</u>	<u>--</u>	<u>46</u>	<u>30</u>	<u>--</u>	<u>--</u>	<u>57.6</u>	<u>7.3</u>
Total/Avg		70	20	47	28	24	45	268.2	28.6

*Fall 1987*

Route 24.3 trips have been discontinued and are now operated as Route 24.0. Schedules have otherwise remained essentially unchanged.

**Table 4-2**  
**Route 24 Weekday Ridership and Productivity Statistics**

		Boardings/VSM							Boardings/
Weekday		Early	AM	PM				All	VSH
<u>Boardings</u>		<u>AM</u>	<u>Peak</u>	<u>Base</u>	<u>Sch</u>	<u>Peak</u>	<u>Eve</u>	<u>Day</u>	<u>All Day</u>
<i>Spring 1986</i>									
Rt 24.0	935	2.3	9.2	4.7	6.0	6.2	2.7	6.6	61.9
Rt 24.1	9	--	4.6	--	--	--	--	4.6	41.5
Rt 24.2	126	--	--	--	--	--	1.9	1.9	21.0
Rt 24.3	427	--	--	7.7	7.1	--	--	7.4	28.9
Tot/Avg	1,497	2.3	9.0	6.9	6.8	6.2	2.1	5.6	52.4

*Fall 1987*

No significant changes have occurred.

Percent of passengers 65 or older (Spring 1986): 14.6%

Percent without a car available for trip (Spring 1986): 83.3%

Spring 1986 peak load points: Inbound: River St. @ Holmfield Ave.  
Outbound: River St. @ Caton St.

<sup>13</sup>T=trip

portion of Route 24.2. Since 1986, based upon MBTA pointchecks, no significant ridership changes are apparent.

At observed Spring 1986 and estimated Fall 1987 ridership levels, there is excess capacity on the route during all time periods. Average peak loads during peak periods were 25 or lower, with the highest peak load observed on any trip at 51. During off-peak periods, including the school period, peak loads averaged 22 or less.

Most Route 24 trips are made by residents of Hyde Park (76 percent) or Mattapan (14 percent). Most of the work and school trips made on the route are within or to Hyde Park (30 percent) or to downtown Boston (25 percent). In addition, ten percent of the work and school trips are made to Mattapan and six percent are made to Dorchester.

A large majority of Route 24 riders (92 percent) walk to the bus at the outer (Hyde Park) end of their trip. At the inbound end of the trip, the largest percentage of riders walk to or from the bus (37 percent), followed with transfers to either the Mattapan High Speed line or the Red Line (32 percent). Most of these transfers are made by those travelling to or from downtown Boston, although a small number of trips are also made to and from other locations along the rapid transit system. In addition, 22 percent make a transfer with another bus route. Of 395 daily bus transfers, the largest numbers were made to Route 32 (95 per day), Route 27 (75), and Route 29 (50). The number of transfers with Route 32 is surprising, since direct connections were only possible during the mid-day on Route 24.3. (This variation, which operated along Dana Street and through Cleary Square, was discontinued in the Spring of 1988 due to bridge weight restrictions. These transfers now require a two-block walk from Logan Square.) In addition to bus and rapid transit transfers, 60 riders per day also use Route 24 as feeder service to commuter rail at Fairmount.

As is the case with most of the SOUTHBus routes, there is a high level of transit dependency on Route 24. Forty-six percent of all riders are either under 18 or 65 or older, and 83 percent do not have a car available for their trip. As a result of the high level of transit dependency, a larger than average number of non-work trips are made on the route (32 percent work; 68 percent non-work), and a large majority of all riders use the MBTA five or more days per week (71 percent).

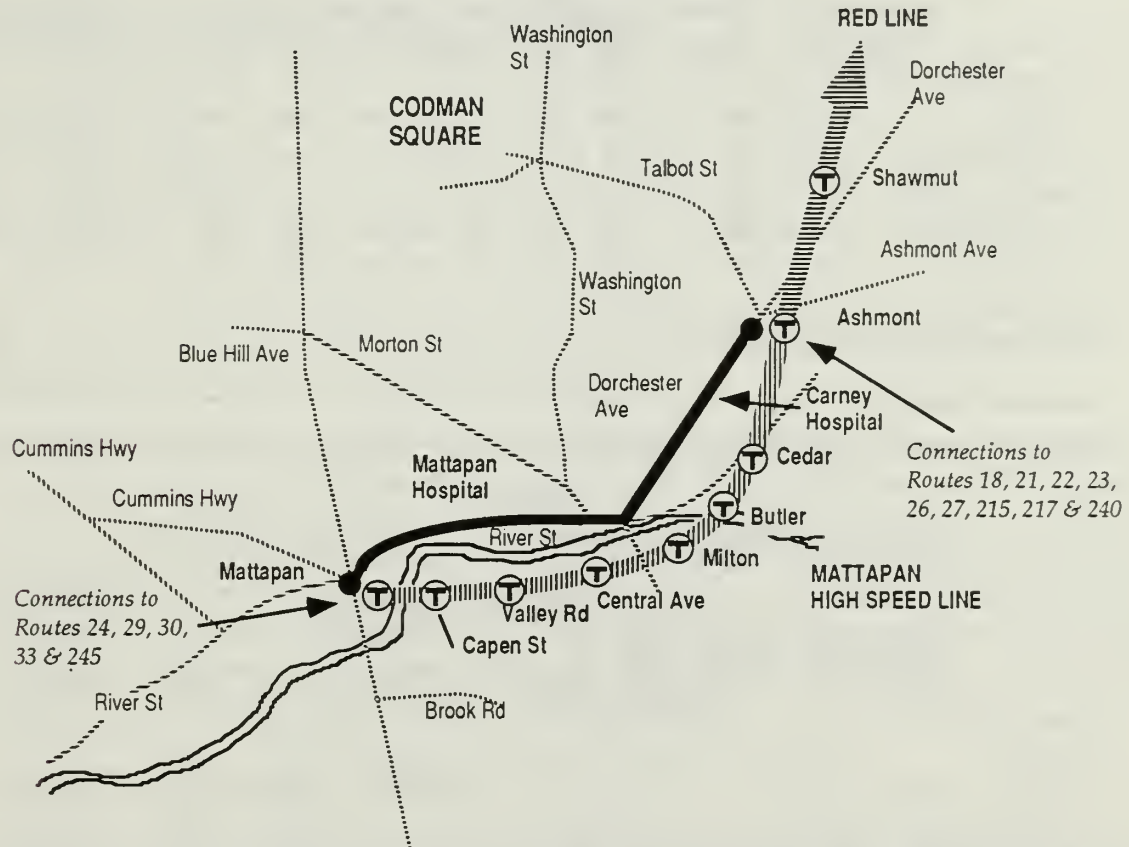
#### Route 27 Mattapan - Ashmont

Route 27 operates between Mattapan and Ashmont stations (see Figure 4-2) between 5:15 am and 1:04 am. However, this service is provided during the mid-day (between 9:15 am and 12:30 pm) by an extension of Route 30 (as



Route 30.1), and after 6:45 pm by Routes 30.1 and 24 (as Route 24.2). The combined service level between Mattapan and Ashmont is 30 minute headways throughout the day (see Table 4-3).

**Figure 4-2**  
**Route 27: Mattapan - Ashmont**



The major functions of Route 27 are to provide local service between Ashmont and Mattapan north of the Neponset River and feeder service to the Red Line at Ashmont. As such, ridership is heavily peaked towards Ashmont in the AM peak and towards Mattapan in the afternoon. Other than the two terminals, the largest trip attractors along the route are two hospitals: Carney Hospital and Mattapan Hospital. Connections to Routes 24, 29, 30, 33, and 245 can be made at Mattapan, and connections to Routes 18, 21, 22, 23, 26, 215, 217, and 240 can be made at Ashmont.

Total ridership on Route 27, including ridership between Mattapan and Ashmont on Routes 24.2 and 30.1, was 960 passenger trips in 1986 (see Table 4-4). Ridership on Route 27 trips only (excluding Route 24.2 and 30.1 ridership)

**Table 4-3**  
**Route 27 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1987): 5:15 am - 1:04 am

	Average One-Way Length	One- Way Trips	<u>Avg Headway (Mins-Peak Dir)</u>						<u>All Day</u>	
			<u>EA</u>	<u>AM</u>	<u>Base</u>	<u>Sch</u>	<u>PM</u>	<u>Eve</u>	<u>VSM</u>	<u>VSH</u>
<i>Spring 1986</i>										
Rt 27	2.2	44	30	30	30	30	30	4T	96.8	11.0
Rt 24.2 as 27	2.2	12	--	--	--	--	--	60	26.2	3.0
Rt 30.1 as 27	2.2	<u>24</u>	<u>--</u>	<u>--</u>	<u>30</u>	<u>--</u>	<u>--</u>	<u>60</u>	<u>52.8</u>	<u>6.0</u>
Total/Avg		80	30	30	30	30	30	30	175.8	20.0

*Fall 1987*

No changes have occurred.

**Table 4-4**  
**Route 27 Weekday Ridership and Productivity Statistics**

	Weekday Boardings	<u>Boardings/VSM</u>							Boardings/ VSH
		<u>Early AM</u>	<u>AM Peak</u>	<u>Base</u>	<u>Sch</u>	<u>PM Peak</u>	<u>Eve</u>	<u>All Day</u>	<u>All Day</u>
<i>Spring 1986</i>									
Rt 27	650	0.0	3.5	8.8	7.7	7.8	6.5	7.4	58.8
Rt 24.2 as 27 <sup>14</sup>	70	--	--	--	--	--	2.6	2.6	23.0
Rt 30.1 as 27 <sup>14</sup>	<u>240</u>	<u>--</u>	<u>--</u>	<u>8.1</u>	<u>--</u>	<u>--</u>	<u>4.0</u>	<u>4.5</u>	<u>40.3</u>
Total/Avg	960	0.0	3.5	8.1	7.7	7.8	3.8	5.5	48.1

*Fall 1987*

No significant changes have occurred.

Percent of passengers 65 or older (Spring 1986): 14.7%

Percent without a car available for trip (Spring 1986): 84.7%

Spring 1986 peak load points: Inbound: Carney Hospital  
Outbound: Carney Hospital

was 750 trips per day. Since that time, based upon MBTA pointchecks, no significant changes in ridership are discernable.

<sup>14</sup>Between Mattapan and Ashmont only.

At these ridership levels, there is excess capacity on Route 27 (including Route 24 and 30 service as Route 27) during all time periods. Standing loads were not observed on any trips, with average peak loads of 21 or less during all time periods, and only 20 in the AM peak half-hour and 24 in the PM peak half-hour. The highest load observed on any trip was 31 in the PM peak.

Most Route 27 riders are residents of Mattapan (55 percent), Dorchester (25 percent) or Hyde Park (10 percent), and most work and school trips are made to Dorchester (40 percent), downtown Boston (32 percent), or Mattapan (10 percent). At the outer end of Route 27 (towards Mattapan), 75 percent of all riders walk to the route, and 23 percent transfer to or from another bus. At the inner end of the route towards Ashmont, 44 percent walk, 42 percent transfer with the rapid transit system, and 14 percent transfer with another bus. All of the bus transfers occur either at Mattapan or Ashmont. At Mattapan, transfers are made with Route 30 (80 per day), Route 24 (75), Route 29 (70), and Route 33 (40). At Ashmont, transfers are made with Route 23 (35), Route 22 (30), Route 26 (10), and Route 215 (5).

Route 27's riders are among the most transit dependent in the SOUTHBus corridor. Thirty-two percent are younger than 18 or older than 64, 85 percent do not have a car available, and nearly 60 percent do not have a driver's license. In addition, 58 percent are from households with annual incomes of \$15,000 or less, and 33 percent of less than \$10,000. As with other routes with high levels of transit dependency, a large number of riders use transit nearly every day (34 percent use the MBTA six or seven days a week). Nearly 47 percent of all Route 27 trips are for work purposes.

### Route 33 Dedham Line - Mattapan

Route 33 operates between Mattapan and the West Roxbury/Dedham Line at the intersection of River and West Milton Streets. The four variations of this route are as follows (see also Figure 4-3):

- 33.4 Dedham Line-Mattapan via River St for entire route.
- 33.5 Dedham Line-Mattapan via Turtle Pond Pkwy, Alwin Rd, Dedham Pkwy, Turtle Pond Pkwy, Smithfield Rd & Reservation Rd.
- 33.6 Dedham Line-Mattapan Inbound via West Milton and Turtle Pond Pkwy, Dedham Pkwy, Alwin St, Smithfield Rd, Reservation Rd to River St. Outbound via River St to Reservation Rd. Smithfield Rd, Turtle Pond Pkwy, Dedham Pkwy, Alwin Rd, Turtle Pond Pkwy, River St, Neponset Valley Pkwy, Readville St to West Milton St to EOL. (Both directions operate around the outer portion of the loop counter-clockwise.)
- 33.7 Dedham Line-Forest Hills. Via West Milton and outbound around loop in same manner as Route 33.6.





Street/West Milton Street and River Street/Neponset Valley Parkway via West Milton Street, Readville Street and the Neponset Valley Parkway, while Route 33.5 travels along River Street. Second, Route 33.6 inbound travels around the Alwin Rd, Dedham Parkway and Turtle Pond Parkway Loop in the opposite direction of Route 33.5 inbound trips. The reasons for these differences are unclear. Both Route 33.5 and 33.6 follow the same alignment outbound.

**Table 4-5**  
**Route 33 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1986): 5:50 am - 7:11 pm

	Average	One-	Avg Headway (Mins-Peak Dir)					All Day	
	One-Way	Way							
	Length	Trips	AM	Base	Sch	PM	Eve	VSM	VSH
Spring 1986									
Rt 33.4		2	1T	1T	--	--	--		0.8
Rt 33.5	5.4	24	26	60	--	--	--	129.6	12.0
Rt 33.6	5.4	20	--	--	30	30	30	108.0	10.0
Rt 33.7	6.6	<u>2</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>2T</u>	<u>13.1</u>	<u>1.0</u>
Total/Avg		48	26	60	30	30	30	250.7	23.8

*Fall 1987*

No changes have been made.

The Route 33.4 and 33.7 variations operate for only two trips per day. The Route 33.4 variation operates for two early outbound trips and skips the Turtle Pond Parkway, Alwin Rd and Dedham Parkway loops in order to get the bus to the end of the line more quickly. The Route 33.7 variations are similar and are the last two runs returning to the Bartlett Garage following completion of the last two outbound trips.

Route 33's four variations carried 1,065 trips when ridechecked in 1986. Nearly all of this ridership was on variations 33.5 and 33.6 (see Table 4-6). Since that time, based upon MBTA pointchecks, it appears that there has been little change in ridership. Ridership is peaked towards Mattapan in the morning (64 percent in the AM peak) away from Mattapan in the afternoon (66 percent in the school and PM peak periods).

As with the other Mattapan routes, there is excess capacity throughout the day. On Route 33, standing loads were not observed on any trip; the highest

**Table 4-6**  
**Route 33 Ridership and Productivity Statistics**

	Weekday Boardings	Boardings/VSM							Boardings/ VSH All Day
		Early	AM				PM	All	
		<u>AM</u>	<u>Peak</u>	<u>Base</u>	<u>Sch</u>	<u>Peak</u>	<u>Eve</u>	<u>Day</u>	
<i>Spring 1986</i>									
33.4	0	0.0	0.0	--	--	--	--	0.0	0.0
33.5	597	--	5.5	3.7	--	--	--	4.6	49.8
33.6	465	--	--	5.0	6.1	3.2	2.1	4.3	46.5
33.7	<u>4</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>0.3</u>	<u>0.3</u>	<u>4.0</u>
Tot/Avg	1,066	0.0	5.5	3.8	6.1	3.2	1.3	4.3	44.8
<i>Fall 1987</i>									

No significant changes have occurred.

Percent of passengers 65 or older (Spring 1986): 19.1%

Percent without a car available for trip (Spring 1986): 86.7%

Spring 1986 peak load points: Inbound: River St. @ Caton St..

Outbound: River St. @ Caton St.

observed load was 39 passengers. The highest average peak loads occur during the school period (outbound) at only 25, and average peak loads during peak periods are 22 passengers or less.

Most Route 33 trips are made by residents of Hyde Park who are either traveling within Hyde Park, or to downtown Boston, Mattapan, or Dorchester. In total, 62 percent of the Route's riders live in Hyde Park and 27 percent in Mattapan. The largest percentage of work or school trips are to downtown Boston (35 percent) or to Hyde Park (30 percent), followed by Dorchester at 10 percent. Work trips account for only 35 percent of all trips, while 26 percent are school trips and 18 percent are shopping trips.

Most of these riders walk to the route at its outer end (85 percent), but towards the Mattapan end, access/egress modes are split between walking (36 percent), transfers with the Mattapan High Speed Line (29 percent), and bus transfers (26 percent). Most transfers are made with Route 32 (105 per day) at Cleary Square, and most are made by Hyde Park residents who originally board or disembark from Route 33 south of Route 32. Ten daily transfers are also made in Cleary Square with Route 50. At Mattapan, bus transfers involve Routes 29 (80 per day), Route 27 (40), and Route 245 (35). In addition, five daily transfers are made with Route 24 at Logan Square.

Route 33 riders are among the most transit dependent of all SOUTHBus riders. Nineteen percent of the route's riders are 65 or older, the second



highest percentage of the SOUTHBus routes (behind Route 40), and 87 percent did not have a car available for their trip, the highest percentage in the corridor. In addition, 22 percent are 17 or younger, and 51 percent are from households with an annual income of less than \$15,000 per year.

## SERVICE COVERAGE

### Overall Assessment of Routes

With the exception of Cleary Square and Mattapan Square, Routes 24, 27 and 33 serve predominantly residential areas, and most residents work outside of the immediate area. From areas served by Routes 24 and 33, the largest numbers of work trips are made to downtown Boston, the Back Bay (including Park Square), and the Fenway/Parker Hill area. These areas are only served indirectly by the two routes, and two or more transfers are usually required. Further, as shown in Table 4-7, while Routes 24 and 33 feed the Red Line, more trips are made to areas served by the Orange Line (Jamaica Plain, Roxbury, the Back Bay and Park Square) than to areas served by the Red Line (Dorchester). Presumably as a result, Routes 24 and 33 carry lower than average percentages of work trips (32 percent on Route 24, and 44 percent on Route 33).

**Table 4-7**  
**Work Trips from Areas Served by Routes 24 and 33**  
(Source: 1980 US Census)

	<i>To:</i>				
	Jamaica Plain/ Roxbury	Back Bay/ Park Square	Dorchester	Financial Dist/ Gov't Ctr	Fenway/ Parker Hill
<i>From Area Served by:</i>					
Route 24	358	159	244	815	319
Route 33	291	347	247	594	264

Based on these market characteristics, Routes 24 and 33 would better serve existing demand if they terminated at Forest Hills instead of Mattapan. Trips to downtown Boston through Mattapan now require two transfers (one with the Mattapan High Speed Line and one with the Red Line). As a result of the two transfers, and because the routing to downtown Boston is less direct through Mattapan, these trips take significantly longer than trips through Forest Hills. Local trips are well served since most are to and from Cleary Square and all four Hyde Park routes operate through the Square.

Considering the large number of trips to and from downtown Boston, Hyde Park service could be improved by providing more direct service to the Orange and Red Lines. To provide more direct service to the Orange Line, Route 24 and/or Route 33 could be rerouted to Forest Hills. This could be done in either of two ways: (1) through a new variation of Route 32 which would operate beyond Cleary Square along the outer end of Route 24 or Route 33 (replacing the existing route(s)), or (2) by extending Route 50 (also replacing the existing route(s)). Better connections could also be provided to the Red Line by extending Routes 24 and 33 to Ashmont (replacing Route 27), thereby eliminating the transfer at Mattapan.

The major benefits of reroutings to Forest Hills would be faster service to downtown Boston and potential operating cost and vehicle savings. In addition to eliminating one transfer, total trip times (including wait times) would be reduced by five to 27 minutes to Downtown Crossing, and by 12 to 39 minutes to Copley Square. Operating savings would result because the reroutings to Forest Hills would essentially be extensions of existing Route 32.0 or Route 50 service, or diversions of Route 32.1 service. The outer ends of either route would be connected with existing Route 32 or 50 service between Cleary Square and Forest Hills, while existing service on the route along River Street between Cleary Square and Mattapan would be discontinued. The major disadvantage of this type of change would be a reduction of service on River Street, which would inconvenience up to 1,530 existing riders.

To continue to provide service along River Street between Logan Square and Mattapan, only one route (either Route 24 or 33) could be rerouted to Forest Hills. Connections to downtown Boston could be improved on the other route by extending it to Ashmont. Different combinations of these options result in seven different alternatives, as listed below and displayed in Figure 4-4.

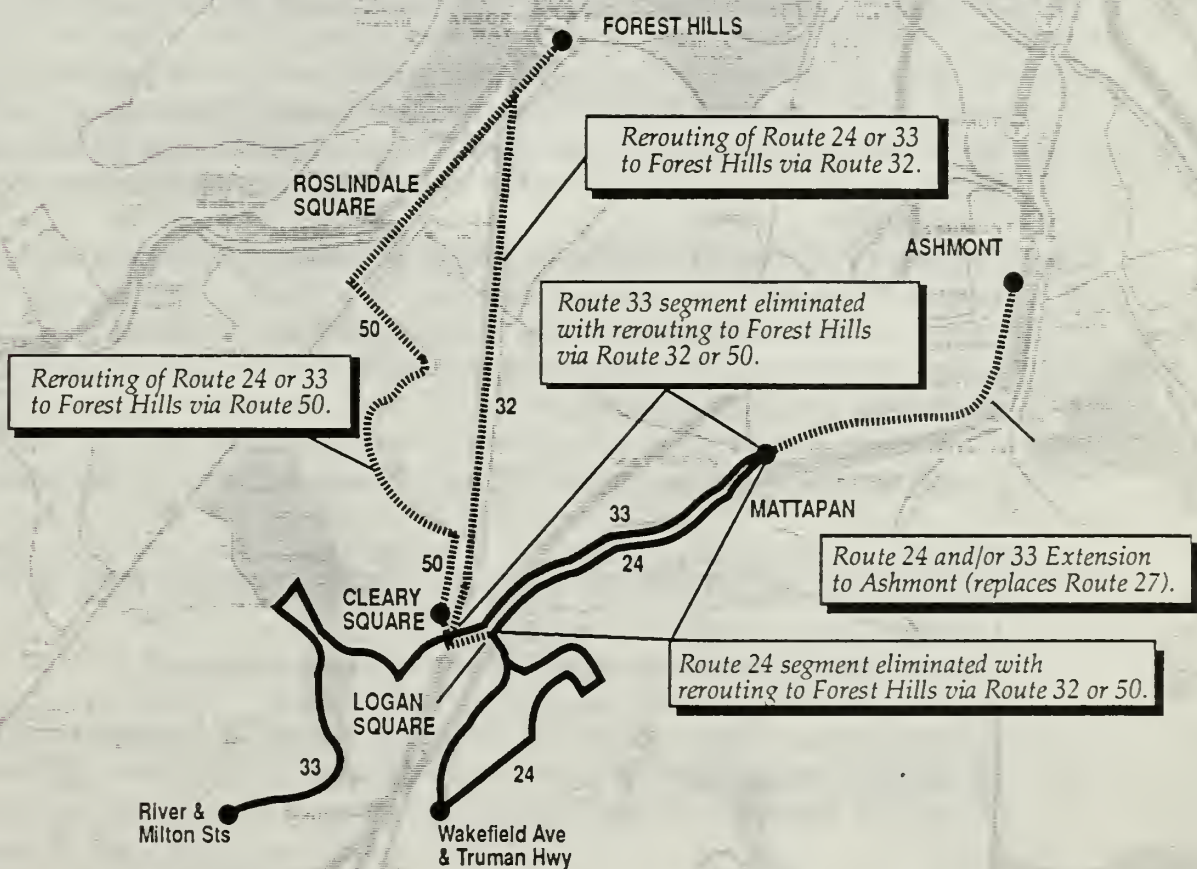
#### **Alternative 1: Extend Route 24 to Ashmont**

- Extend all Route 24 trips to Ashmont. This extended service would replace Route 27.
- Coordinate Route 24 and 33 service along River Street.

#### **Alternative 2: Extend Route 33 to Ashmont**

- Extend all Route 33 trips to Ashmont. This extended service would replace Route 27.
- Coordinate Route 24 and 33 service along River Street.

**Figure 4-4**  
**Options for Improving Service from the Outer Ends**  
**of Routes 24 and 27 to Downtown Boston**





**Alternative 3: Extend Both Route 24 and 33 to Ashmont**

- Extend all Route 24 and 33 trips to Ashmont. This extended service would also replace Route 27.
- Coordinate Route 24 and 33 service along River Street.

**Alternative 4: Route 24 to Forest Hills via Route 32; Route 33 to Ashmont**

- Reroute Route 24 to Forest Hills. This would be done by extending every other Route 32.0 trip along the outer end of Route 24 during peak periods, and by diverting every other off-peak Route 32.1 trip from Wolcott Square to the outer end of Route 24. For these purposes, this service is called Route 32.24.
- Extend all Route 33 trips to Ashmont. This extended service would replace Route 27.
- Eliminate the current Route 24. Existing Route 24 service along River Street between Cleary Square and Mattapan would be replaced by additional Route 33 service.

**Alternative 5: Route 33 to Forest Hills via Route 32; Route 24 to Ashmont**

- Reroute Route 33 to Forest Hills. This would be done by extending every other Route 32.0 trip along the outer end of Route 33 during peak periods, and by diverting every other off-peak Route 32.1 trip from Wolcott Square to the outer end of Route 24. For these purposes, this service is called Route 32.33.
- Extend all Route 24 trips to Ashmont. This extended service would replace Route 27.
- Eliminate the current Route 33. Existing Route 33 service along River Street between Cleary Square and Mattapan would be replaced by additional Route 24 service.

**Alternative 6: Route 24 to Forest Hills via Route 50; Route 33 to Ashmont**

- Reroute the outer end of Route 24 to Forest Hills. This would be done by extending all Route 50 trips along the outer end of Route 24. For these purposes, this service is called Route 50.24.
- Extend all Route 33 trips to Ashmont. This extended service would replace Route 27.
- Eliminate the current Route 24. Existing Route 24 service along River Street between Cleary Square and Mattapan would be replaced by additional Route 33 service.

Alternative 7: Route 33 to Forest Hills via Route 50; Route 24 to Ashmont

- Reroute the outer end of Route 33 to Forest Hills. This would be done by extending all Route 50 trips along the outer end of Route 33. For these purposes, this service is called Route 50.33.
- Extend all Route 24 trips to Ashmont. This extended service would replace Route 27.
- Eliminate the current Route 33. Existing Route 33 service along River Street between Cleary Square and Mattapan would be replaced by additional Route 24 service.

Alternatives 1 and 2 (Extend Route 24 or 33 to Ashmont)

When Route 24 was surveyed, 24 percent of the route's riders, or 360 per day, were making trips to or from downtown Boston. In addition, another 120 riders transferred to the Red Line for trips to other destinations, and 75 made transfers with Route 27.

For nearly all of these trips, one transfer could be eliminated by combining Route 24 with Route 27. For trips to downtown Boston and other locations along the rapid transit system, the transfer with the Mattapan High Speed line would be eliminated, thus reducing the number of transfers by one. For trips to or from Route 27, the number of transfers for most trips would be reduced from one to none. In total, the extension would eliminate a transfer for up to 37 percent, or 555, of Route 24's weekday riders.

On Route 33, 26 percent, or 235 daily riders, make trips to and from downtown Boston, another 70 riders transferred to the Red Line for trips to other destinations, and 40 made transfers with Route 27. In total, an extension to Ashmont would eliminate a transfer for up to 33 percent, or 345, of Route 33's weekday riders. As shown in Table 4-8, in terms of both the number of riders benefited and the percent of each route's riders that would benefit, more benefit would be obtained from an extension of Route 24 in Alternative 1 than from Route 33 in this alternative.

---

Table 4-8  
Alternatives 1 and 2: Benefits to Existing Riders  
(number of passengers benefiting)

	<u>Route 24</u>	<u>Route 33</u>
Mattapan High Speed Line Transfers Eliminated	480	305
Route 27 Transfers Eliminated	<u>75</u>	<u>40</u>
Total	555	345

---

Although either extension would result in better service for existing riders and the attraction of new riders, they would also result in a loss of fare revenue due to the elimination of the transfer. The elimination of the transfer on Route 24 would likely attract an additional 70 riders per day, which based on an average fare of 30 cents, would result in new annual revenue of \$5,300. However, the MBTA would lose revenue on trips made by existing riders that do not use a pass because the paid transfer with Route 27 would be eliminated. On Route 24, 65 percent of the route's riders pay cash fares, with an average fare of 32 cents. Loss of transfer revenue from these riders would result in an annual revenue loss of \$3,900. Therefore, the net fare increase would be only \$1,400.

A combination of Routes 24 and 27 would result in additional scheduling flexibility. As with current schedules for Routes 24 and 27, some awkward cycle times would still result. However, for most of the day, the same number of vehicles could be used to provide more service at essentially the same cost. In addition, during the evening, headways could be increased to 60 minutes, which would save one vehicle. Round trip running times, required layover times, and proposed headways for the combined route would be as shown in Table 4-9.

**Table 4-9**  
**Route 24/27 Combination**  
**Schedule Statistics (in minutes)**

	<u>7:00 am - 8:59 am</u>	<u>9:00 am - 1:59 pm</u>	<u>2:00 pm - 5:59 pm</u>	<u>6:00 pm - 8:59 pm</u>	<u>9:00 pm - 6:59 am</u>
<i>Route 24 segment</i>					
Round Trip Run Time	33	35	33	31	27
Req'd Layover Time	8	3	6	3	8
<i>Route 27 segment</i>					
Round Trip Run Time	22	22	22	20	19
Req'd Layover Time	4	4	4	3	4
<i>Total Route</i>					
Round Trip Run Time	55	57	55	51	46
Req'd Layover Time	12	7	10	6	12
Optimum Cycle Time	67	64	65	57	58
<i>Alternative Headways</i>	25	35	25	30	60
<i>Vehicle Requirement</i>	3	2	3	2	1
<i>Cycle Time</i>	75	70	75	60	60

At these headways, a similar level of service would be provided on Route 24 during all periods (within five minutes of original headways), but headways



would be longer in the AM peak (25 minutes versus a current 20 minutes) and PM peak (25 minutes versus 24 minutes). (Slightly shorter headways could be provided, but the headways listed in Table 4-9 would be required to coordinate service with Route 33, as discussed in the following paragraph.) On Route 27 headways would be shorter during all periods except the base period, when headways would be increased from 30 minutes to 35 minutes, and in the evening, when headways would be increased from 30 minutes to 60 minutes.

At these headways, Route 24 service could be coordinated with Route 33 during the AM peak, school, and PM peak periods. However, it would not be possible to coordinate base period service without adding one additional vehicle to Route 33 or lengthening Route 24 headways from 35 minutes to 45 minutes.

Although figures are not displayed here, the scheduling implications of a Route 33 extension to Ashmont would be the same as with the Route 24 extension. Route 33 could operate at the same headways, and with the same vehicle requirements and cycle times as shown for the Route 24 extension in Table 4-9. Route 33 service could also be coordinated with Route 24 during the AM, school and PM peak periods.

#### Alternative 3 (Extend Both Route 24 and 33 to Ashmont)

An extension of both Routes 24 and 33 as designed in Alternatives 1 and 2 could be easily implemented with all service coordinated. Further, vehicle requirements would increase by one, and, as with current Route 24 and 33 service, most trips would operate well below capacity. Alternatively, the same number of vehicles currently deployed on Routes 24, 27 and 33 could be deployed to extend all Route 24 and 33 trips to Ashmont and to coordinate service. This would result in a slightly lower level of service than is now provided along the outer ends of Routes 24 and 33, but benefits due to the service coordination and the elimination of the transfer at Mattapan should more than offset the lower level of service.

To most effectively utilize the existing vehicles (five during the AM peak, school and PM peak periods, three during the the base period, and two during the evening), it would be necessary to interline all Route 24 and 33 trips. This would effectively allow two and one-half vehicles to be deployed on each route during the AM, school and PM peak periods, and one and one-half during the base periods. Also, since the running times on Route 24 are shorter than on Route 33, longer layover times would need to be scheduled on the outer end of Route 24 in order to coordinate inbound service.

Based on observed travel times for Routes 24, 27 and 33, schedule statistics for extensions of Routes 24 and 33 would be as shown in Table 4-10. The

combined round trip running times for the two routes would range from 107 to 119 minutes, with recovery times of 11 to 22 minutes required. All trips would layover at Ashmont and the outer end of each route. Mattapan layovers would be eliminated.

Based on these schedule statistics, headways on each route could be set at 30 minutes during peak periods, and 45 minutes during the mid-day. Along River Street, this would result in combined headways of 15 and 22.5 minutes. As shown in Table 4-11, headways would be longer along the outer ends of Route 24 and 33, but headways along River Street would be the same or shorter for most of the day, and service could operate at even intervals.

As mentioned above, because Route 24 has a shorter running time than Route 33, Route 24 trips would have to layover for a longer time at its outer end than would Route 33 trips in order for inbound trips to be coordinated. The additional outer end layover time required would be equivalent to the difference in round trip running times between the two routes, or five to eight minutes longer throughout most of the day. This additional layover time would be available within the cycle times listed above in Table 4-11.

**Table 4-10**  
**Alternative 3 Schedule Statistics**  
**Extension of All Route 24 and Route 33 Service to Mattapan**

	Early <u>AM</u>	AM <u>Peak</u>	<u>Base</u>	<u>School</u>	PM <u>Peak</u>	<u>Evening</u>
<i>Route 24/27</i>						
Round Trip Run Time	46	55	57	55	55	51
Req'd Recovery Time	12	12	7	10	10	6
Optimum Cycle Time	58	67	64	65	65	57
<i>Route 33/27</i>						
Round Trip Run Time	61	63	62	63	63	55
Req'd Recovery Time	6	9	8	12	12	5
Optimum Cycle Time	67	72	70	75	75	60
<i>Routes 24/27 and 33/27 Combined</i>						
Round Trip Run Time	107	118	119	118	118	106
Req'd Recovery Time	18	21	15	22	22	11
Optimum Cycle Time	125	139	134	140	140	117
<i>Headways Possible with Interlined Service</i>						
Headways	65	30	45	30	30	60
Vehicles Required	2	5	3	5	5	2
<i>Resulting Cycle Time</i> <i>(Rt 24 round trip plus</i> <i>Rt 33 round trip)</i>	130	150	135	150	150	120

Table 4-11  
Alternative 3 Headways Compared to Existing Headways

	AM <u>Peak</u>	<u>Base</u>	<u>School</u>	PM <u>Peak</u>	<u>Evening</u>
<i>Existing Headways</i>					
Route 24	20	47	28	24	45
Route 27	30	30	30	30	30
Route 33	26	60	30	30	30
Route 24 & 33 Combined	12	27	15	14	19
<i>Alternative Headways</i>					
Route 24/27	30	45	30	30	60
Route 33/27	30	45	30	30	60
Route 24/27 & 33/27 Combined	15	23	15	15	30

However, due to the long layover that would result, consideration should also be given to moving the layover point from the intersection of Wakefield Avenue and Truman Highway to the vicinity of Fairmount Ave and Beacon Street before 11:00 am. As further discussed in the section, "Relocation of Route 24's Layover Point," this would prevent inbound riders that board along the outbound leg from having to layover with the bus.

This alternative would benefit existing riders that currently make a transfer with the Mattapan High Speed Line and those that now ride Route 27 (due to shorter headways). However, passengers south of Cleary Square would be inconvenienced due to longer headways. Passengers between Cleary Square and Mattapan would also experience slightly longer average headways, but this should be offset by the coordination of new service. Considering each of these impacts, this alternative should increase bus ridership by up to 160 trips per day and decrease passenger wait times by 102 hours per day (see Table 4-12).

Since this alternative involves operating the same number of vehicles and vehicle hours as are currently operated on Routes 24, 27, and 33, the operating cost impact of this alternative would be negligible. The new riders would increase operating revenues by \$12,000 per year, partially offset by a loss of \$5,986 in transfer revenue. Therefore, the net fare revenue gain would be \$6,000 per year.

Alternatives 4 and 5 (Routes 24 and 33 to Forest Hills via Route 32)

Connecting Route 24 or 33 to Forest Hills by extending Route 32 would provide the fastest service to downtown Boston of the six alternatives since



**Table 4-12**  
**Alternatives 3: Summary of Weekday Ridership Impacts**

	<u>Riders Affected</u>	<u>Ridership Change</u>	<u>Impact on Pax Wait Time (hrs)</u>
• Eliminate transfer with Mattapan High Speed Line	670	+35	-65.2
• Shorter headway between Mattapan and Ashmont	719	+184	-65.9
• Longer headways on Rt 24 south of Cleary Sq	536	-49	+24.1
• Longer headways on Rt 33 south of Cleary Sq	<u>492</u>	<u>-10</u>	<u>4.9</u>
<b>Total</b>		<b>+160</b>	<b>-102.1</b>

Route 32 travel times are two to four minutes shorter between Cleary Square and Forest Hills than those on Route 50. Both alternatives would require the creation of a new variation of Route 32 (32.24 or 32.33), which would replace approximately 50 percent of all existing Route 32.0 and off-peak Route 32.1 trips. This would increase the complexity of Route 32 somewhat, but since all trips would continue to operate between Forest Hills and Cleary Square in the same manner, most riders would be unaffected. Along the outer end of Route 32.1 (beyond Cleary Square), off-peak service levels would be reduced by 50 percent, since half of those trips would be diverted to the Route 32.24 or 32.33 variation.

Under Alternative 4, with Route 32.24 operating to Forest Hills, trips from the Fairmount area to areas along River Street or to Mattapan would require a transfer to Route 33 at Cleary Square. Under Alternative 5, with Route 32.33 operating between the Dedham Line and Forest Hills, trips from south of Cleary Square to areas along River Street north of Cleary Square or to Mattapan would require a transfer to Route 24. Without changes to Route 24 as well, this transfer would require a two block walk from Cleary Square to Logan Square (since Route 24 does not currently operate through Cleary Square). However, since the Dana Avenue bridge is closed to buses due to weight restrictions, a routing through Cleary Square would be difficult to provide.

As would be expected, ridership and cost impacts are to a large degree dependent on the levels of service provided on the three routes involved (Routes 24, 32 and 33). The levels of service assumed in the two alternatives

(see Table 4-13) include headways along the outer ends of Routes 24 and 33 that approximate existing levels, but a lower level of service along River Street. Less service along River Street reflects lower ridership due to the diversion of trips from Mattapan to Forest Hills, and adjustments for the underutilization of the existing service. Route 24's headways would be unaffected.

**Table 4-13**  
**Alternative 4 and 5 Headways**

	<u>AM</u> <u>Peak</u>	<u>Base</u>	<u>School</u>	<u>PM</u> <u>Peak</u>	<u>Evening</u>
<i>Existing Headways</i>					
Route 24	20	47	28	24	45
Route 33	26	60	30	30	30
Route 32.0	9			16	
Route 32.1	12	15	14	16	28
Combined 24/33 on River St	12	27	15	14	19
<i>Alternative 4 Headways</i>					
Route 32.24	24	30	30	28	60
Route 33	25	35	25	25	30
<i>Alternative 5 Headways</i>					
Route 24	22	35	22	22	30
Route 32.33	24	30	30	28	30

For Alternative 4, along the outer end of what is now Route 24, headways were set as close as possible to existing headways given estimated Route 32.24 cycle times. This results in slightly longer peak period headways, shorter headways during the mid-day, and longer headways in the evening. Since Route 24 now operates until 1:04 am, it was assumed that Route 32.24 service would also operate until approximately 1:00 am. On Route 33, headways were set at the levels required to carry River Street loads within MBTA loading standards. This results in shorter Route 33 headways during all time periods except the evening, where they would remain at 30 minutes. However, these headways are significantly longer than the existing combined Route 24/33 headways along River Street. On Route 33, the service span was also extended until approximately 1:00 am so that evening trips along River Street would continue to be served.

For Alternative 5, as with Alternative 4, headways on service rerouted to Forest Hills were also set as close to existing headways as possible, and headways along River Street were set according to MBTA loading standards. Differences in headways along River Street between the two alternatives are due to differences in Route 24 and 33 cycle times that govern the headway

possibilities. In this case, Route 32.33 headways are shorter or the same as existing Route 33 headways during all time periods, and Route 24 headways are shorter than existing Route 24 headways during all periods except the AM peak. However, headways along River Street would be significantly longer than current Route 24/33 headways combined. Route 32.33 service would only operate until approximately 7:30 pm.

With either alternative, existing riders can be categorized in three different groups: (1) those that will benefit from the changes, (2) those that will be inconvenienced, and (3) those that will be affected only by the headway changes. Using the above service levels, the impacts on each group were estimated using typical elasticity values applied to changes in headways, transfers, and travel times. In terms of passenger impacts, as summarized in Table 4-14, more existing riders would be inconvenienced by the changes than would benefit, and both alternatives would result in overall ridership losses. This would be primarily because of the service taken off of River Street and the off-peak service reduction along Route 32.1 beyond Cleary Square. At present, approximately 1,530 of Route 24 and 33's combined ridership of 2,565 only use either route between Cleary Square and Mattapan. With one route redirected to Forest Hills, headways for these riders would increase significantly, resulting in probable ridership losses of 290 to 340 daily riders (19 to 22 percent of this market) and large increases in wait time for remaining riders. Beyond Cleary Square, off-peak Route 32.1 service is used by 565 riders per day, and a 50 percent service reduction would result in the loss of 13 to 16 percent of those riders. By comparison, although travel time savings for downtown Boston-bound riders would be large, fewer than 180 riders per day on either route would benefit.<sup>15</sup>

Although it would appear that either alternative should reduce operating costs significantly, this would not be the case. In both alternatives, the amount of service that would have to be added to extend Route 32 and to replace some the service taken off of River Street almost equals the savings (see Table 4-15). This is due to a combination of slightly higher levels of service being provided on the Route 32 extensions than would be taken off of Route 24 or 33 (due to cycle time constraints) and the type of replacement service that would be required. For example, at present Route 24 operates until 1:04 am, while Route 33 operates only until 7:11 pm. If Route 24 were rerouted away from River Street to Forest Hills as in Alternative 4, Route 33's service span would have to be extended from 7:11 pm until 1:04 am to replace Route 24 service along River Street. This would add service, and the cost of providing service, along Route 33 beyond Cleary Square during the evening where none now exists. This would reduce total cost savings to \$28,000 per

---

<sup>15</sup>Downtown Boston plus Back Bay plus existing transfers to Route 32 to downtown Boston.



Table 4-14  
Alternatives 4 and 5: Summary of Ridership Impacts

	Alternative 4			Alternative 5		
	Riders Affected	Rider- ship Change	Impact on Pax Wait Time (hrs)	Riders Affected	Rider- ship Change	Impact on Pax Wait Time (hrs)
•Eliminate transfer with Matt. High Speed Line	84	+20	-28.1	90	+24	-34.8
•Eliminate transfer with Route 32	82	+11	-13.8	90	+17	-22.0
•Travel time savings to downtown Boston <sup>16</sup>	71	+4	-6.7	59	+2	-3.9
•Travel time savings to Back Bay	9	+1	-2.4	31	+5	-7.2
•Impose new transfer at Cleary Square	95	-18	+24.5	128	-18	+24.5
•Longer hdwy on River St. north of Cleary Sq	1,531	-340	+110.0	1,532	-292	+93.2
•Longer hdwy on Outer End of Route 32.1	565	-150	+59.0	460	-122	+41.1
•Different headways on Rt 24 south of Cleary Sq	537	-8	+2.2	537	+35	-21.6
•Different headways on Rt 33 south of Cleary Sq	493	<u>+51</u>	<u>-28.1</u>	493	<u>+56</u>	<u>-28.6</u>
Total		-429	+116.6		-293	+40.7

year. For Alternative 5, this additional service would not be required, so that savings would be greater, but still relatively small for changes of this magnitude, at \$45,000 per year.

Further, although Alternative 5 could reduce overall passenger times while reducing the amount of service provided, these savings would be at the expense of lost ridership. The amount of ridership lost, in turn, would be large compared to the amount of service saved, at 55.3 passengers lost per vehicle hour saved.

<sup>16</sup>Exclusive of wait times. Therefore, these figures do not include benefits to riders who currently transfer to Route 32 for trips to Boston. Benefits for those riders are included in item 2.

**Table 4-15**  
**Alternatives 4 and 5: Cost and Service Impacts**

	<u>Alternative 4</u>		<u>Alternative 5</u>	
	<u>Weekday</u> <u>Cost Impact</u>	<u>Change in</u> <u>Veh Hours</u>	<u>Weekday</u> <u>Cost Impact</u>	<u>Change in</u> <u>Veh Hours</u>
Route 24	-\$1,013	-28.6	+\$148	4.3
Route 33	+584	15.5	-880	-23.8
Route 32.0	+215	6.3	+298	6.6
Route 32.1	<u>+103</u>	<u>3.9</u>	<u>+253</u>	<u>7.6</u>
<b>Total</b>	<b>-\$111</b>	<b>-2.9</b>	<b>-\$181</b>	<b>-5.3</b>

**Alternatives 6 and 7 (Rerouting Routes 24 and 33 to Forest Hills via Route 50)**

Rerouting Route 24 or 33 to Forest Hills via Route 50 would increase travel times by two to four minutes over reroutings via Route 32 (but still up to 23 minutes shorter to Downtown Crossing and up to 35 minutes shorter to the Back Bay than existing services), but would eliminate the ridership losses associated with diverting half of the off-peak Route 32.1 trips. In addition, since current Route 50 headways approximate existing Route 24 and 33 headways during all periods through early evening, all Route 50 trips could be extended.

As with Alternatives 4 and 5, trips made from the outer ends of either Route 50.24 or 50.33 beyond Cleary Square would require a transfer at Cleary Square to the service remaining along River Street to complete trips to River Street north of Cleary Square or to Mattapan. As with Alternative 5, the implementation of Route 50.33 in Alternative 7 would require a two block walk from Cleary Square to Logan Square to transfer with Route 24, unless Route 24 was rerouted through Cleary Square.

Also, as with Alternatives 4 and 5, ridership and cost impacts are largely dependant upon service levels. Again, the levels of service assumed along the outer ends of Route 24 and 33 match current service levels as closely as possible, while headways along River Street between Cleary Square and Mattapan have been set according to MBTA loading standards. One major change, however, is that where Route 32.24 in Alternative 4 would operate until 1:00 am by diverting evening Route 32.1 trips, Route 50.24 in Alternative 6 would operate only until approximately 7:00 pm. This change was made because Route 50 does not operate during the evening, and the cost of adding evening service would result in a total cost increase for Alternative 6.

For Alternative 6, the resulting headways are the same on Route 50 during all periods except the base period, where headways would increase slightly from 46 to 50 minutes (see Table 4-16). Headways on the outer ends of what are now Routes 24 and 33 would increase during all periods except on Route 24 in the base period, where headways would also be slightly increased from 47 to 50 minutes. Trunk headways along River Street between Cleary Square and Mattapan would increase significantly during all periods, as in Alternatives 4 and 5. For Alternative 7, Route 50 headways would be within two minutes of existing headways during all periods. Route 24 headways would be shorter during all periods, but headways along River Street would still be significantly longer.

**Table 4-16**  
**Alternative 6 and 7 Headways**

	AM <u>Peak</u>	<u>Base</u>	<u>School</u>	PM <u>Peak</u>	<u>Evening</u>
<i>Existing Headways</i>					
Route 24	20	47	28	24	45
Route 33	26	60	30	30	30
Route 50	20	46	20	20	25
Combined 24/33 Headway on River St.	12	27	15	14	19
<i>Alternative 6 Headways</i>					
Route 33	25	35	25	25	30
Route 50.24	20	50	20	20	20
<i>Alternative 7 Headways</i>					
Route 24	22	35	22	22	30
Route 50.33	20	45	22	22	21

With these two alternatives, impacts would be similar to those of Alternative 4 and 5: more riders would be inconvenienced than would benefit, and operating savings would be relatively small. As shown in Table 4-17, riders along River Street between Cleary Square and Mattapan would still experience large headway increases that would result in a loss of 290 to 340 daily riders. Riders along the outer end of Route 32.1 would not be affected, so that ridership losses would be smaller with either of these alternatives than with the prior two, although significant.

Alternative 7 would result in a net savings in passenger wait and travel time, but at a cost of losing 157 daily riders. The time savings would largely be the result of shorter headways along the outer ends of Routes 24 and 33, and the elimination of the transfer with the Mattapan High Speed Line.



**Table 4-17**  
**Alternatives 6 and 7: Summary of Ridership Impacts**

	Alternative 6			Alternative 7		
	<u>Riders Affected</u>	<u>Rider-ship Change</u>	<u>Impact on Pax Wait Time (hrs)</u>	<u>Riders Affected</u>	<u>Rider-ship Change</u>	<u>Impact on Pax Wait Time (hrs)</u>
• Eliminate transfer with Matt. High Speed Line	84	+10	-17.9	90	+24	-34.8
• Eliminate transfer with Route 32	0	0	0.0	9	+2	-3.4
• Travel time savings to downtown Boston <sup>17</sup>	71	+2	-2.9	60	+15	-17.7
• Travel time savings to Back Bay	9	+1	-1.6	30	+3	-5.8
• Impose new transfer at Cleary Square	95	-18	+24.5	128	-17	+24.4
• Lower hdwy on River St. north of Cleary Sq	1,531	-340	+110.0	1,532	-294	+93.2
• Loss of Rt 24 outer end evening Riders	25	-25				
• Different headways on Rt 24 south of Cleary Sq	537	-10	+1.8	537	+34	-21.6
• Different headways on Rt 33 south of Cleary Sq	493	<u>+51</u>	<u>-28.1</u>	493	<u>+74</u>	<u>-35.9</u>
<b>Total</b>		<b>-327</b>	<b>+82.5</b>		<b>-157</b>	<b>+4.3</b>

Both of these alternatives would also reduce operating costs slightly (see Table 4-18). Alternative 7 would result in the highest cost savings of the alternatives that would redirect service to Forest Hills, although these savings would still be relatively low, at \$55,000 per year. Alternative 7 would also be the only alternative to result in a somewhat reasonable number of passengers lost per vehicle hour saved, at 29.6 (compared to 112.8 for Alternative 6).

### Other Service Improvement Options

The final four improvement options examined involve relatively minor changes that could improve passenger and driver convenience. These are:

<sup>17</sup>Exclusive of wait times. Therefore, these figures do not include benefits to riders who currently transfer to Route 32 for trips to Boston. Benefits for those riders are included in item 2.

Table 4-18  
Alternatives 6 and 7: Cost and Service Impacts

	Alternative 6		Alternative 7	
	<u>Weekday Cost Impact</u>	<u>Change in Veh Hours</u>	<u>Weekday Cost Impact</u>	<u>Change in Veh Hours</u>
Route 24	-\$1,013	-28.6	+\$148	4.3
Route 33	+584	15.5	-880	-23.8
Route 50	<u>+377</u>	<u>3.9</u>	<u>+512</u>	<u>7.6</u>
Total	-\$52	-2.9	-\$220	-5.3

(1) a relocation of Route 24's outer end layover point to reduce passenger wait time, (2) the operation of Route 33.6 trips as Route 33.5 so that passengers would board on the same side of the street throughout the day on the Reservation loop, (3) a simplified turnaround at the Dedham end of Route 33, and (4) coordination of Route 24 and 33 service along River Street.

*Relocation of Route 24's Outer End Layover Point to Fairmount Avenue and Beacon Street Before 11:00 AM*

Presently, inbound Route 24 riders that board before or along the initial segment of the outer loop while the bus is still traveling "outbound," must layover with the bus. Before 11:00 am, when nearly all ridership on the loop is traveling towards River Street, the passenger wait time involved in the layover could be eliminated by relocating the layover point to the vicinity of Fairmount Avenue and Beacon Streets. After 11:00 am, when there are more outbound riders than inbound riders along the loop, the layover point should remain where it is.

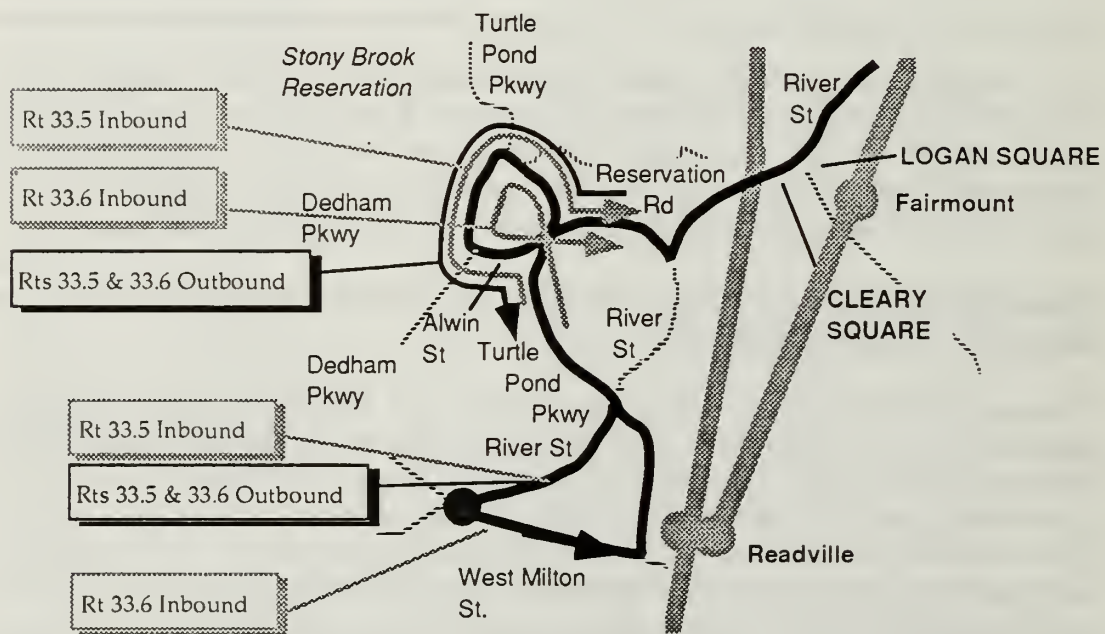
If the loop were reversed and all trips operated through Cleary Square as discussed above, a similar strategy should still be employed. Before 11:00 am, the layover point should be located in the vicinity of Dana Avenue and Truman Highway. After that time, it should be shifted to the vicinity of Beacon Street and Fairmount Avenue.

*Operation of All Route 33.6 Trips as Route 33.5*

Between the outer end of Route 33 and Cleary Square, the PM variation (Route 33.6) travels inbound along a different alignment than does the AM variation (Route 33.5), while both variations follow the same outbound alignment. The differences occur between the end of the line and the intersection of River Street and the Neponset Valley Parkway, and along the Reservation Road/Dedham Parkway/Alwin Street loop (see Figure 4-5).

From the end of the line inbound, Route 33.5 travels straight up River Street until Turtle Pond Parkway, while Route 33.6 travels from the end of the line along West Milton Street to Readville Street to the Neponset Valley Parkway to River Street. Around the loop, Route 33.5 travels inbound in a clockwise direction, and Route 33.6 travels around the same loop in a counter-clockwise direction. This means that inbound riders must board on one side of the street before 2:00 pm and on the other side of the street after 2:00 pm, which is confusing for occasional riders.

Figure 4-5  
Routing of Route 33.5 and 33.6 Variations



The reasons for either difference could not be positively determined. One reason given for the operation of Route 33.6 around the loop in a counter-clockwise direction was so that riders could be let off on the side of the street that most were traveling from. However, if this were the case, more riders would benefit from operating the Route 33.5 variation in the same manner in the morning when most of the inbound boardings occur. In any event, the route would be simplified by operating all Route 33.5 and 33.6 trips inbound around the loop in the same manner. Since riders usually expect inbound and outbound trips to operate on opposite sides of the street, and since most inbound riders along the loop now board Route 33.5 trips, Route 33.6 trips should operate around the loop in the same manner as Route 33.5.



### *Simplification of Turnaround at Dedham End of Route 33*

At the outer end of the route, it is possible that the West Milton Street alignment is used to simplify the turn-around at the end of the line during the PM peak. Before 2:00 pm, buses on the Route 33.5 variation must make a U-turn in the intersection of River Street and West Milton Street, while in the afternoon, they take a left onto West Milton Street instead of making the U-turn. During the morning, the U-turn is apparently not a difficult maneuver, but afternoon traffic conditions may be worse.

Most riders along this segment board and disembark along River Street. In total, 105 daily riders use the River Street stops, and fewer than 20 use the stops on West Milton Street, Readville Street and the Neponset Valley Parkway. These figures are not surprising, since most trips operate along the River Street alignment. In addition, most of the riders that would board along West Milton and Readville Streets are within walking distance of River Street, since that is where they must disembark on outbound trips. This being the case, the route would be simplified without losing ridership by operating all trips inbound along the same alignment as outbound trips, or the same as Route 33.5 inbound trips. In effect, this change, in combination with the one above on the loop, would result in the operation of all Route 33.6 trips as Route 33.5 trips.

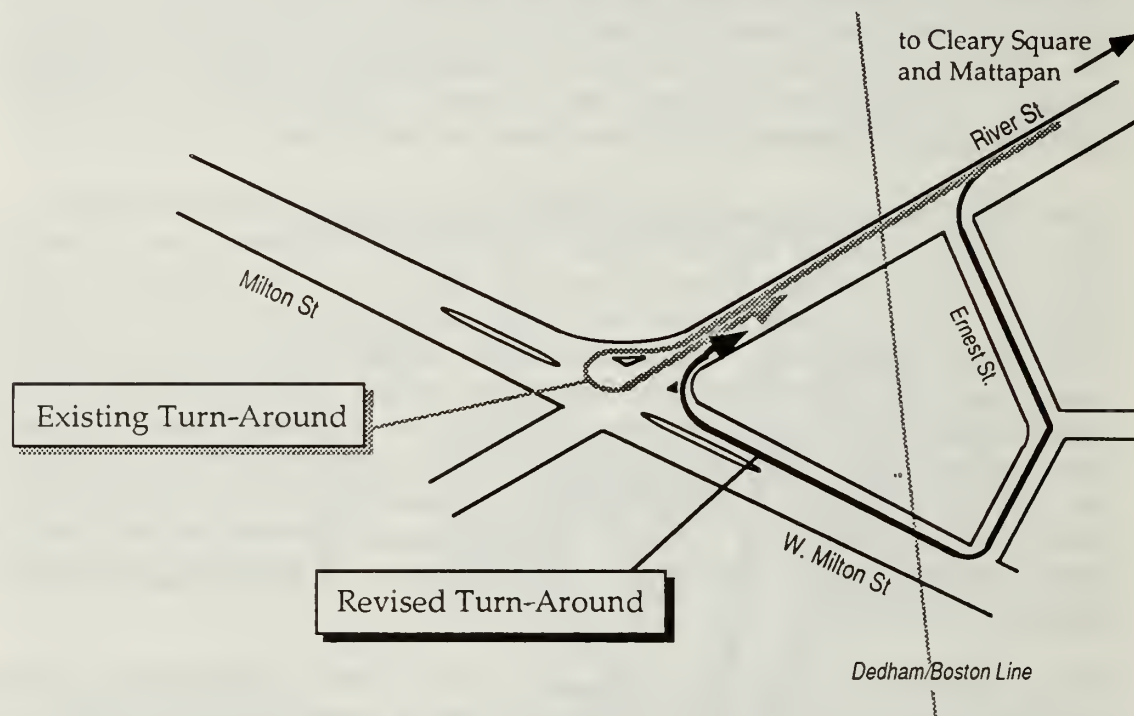
If the turn-around at the end of the line needs to be simplified, this could be done as shown in Figure 4-6. Outbound trips would turn left onto Cross Street, and then right on West Milton Street to the end of the line and a layover point on West Milton Street just before the intersection of River Street.

### *Coordination of Route 24 and Route 33 Service Along River Street*

Service to Route 24 and Route 33 riders along River Street between Cleary Square and Mattapan could be improved by coordinating service on the two routes. At this time, service on the two routes is not coordinated although they share the same alignment between Logan Square and Mattapan. Peak period headways range from zero to 20 minutes.

Coordination of Routes 24 and 33 could be accomplished best under Alternative 3, discussed above. However, in the absence of extending these routes to Ashmont, the existing routes could still be coordinated during most of the day. In most cases, this would involve extending Route 24 headways to match Route 33 headways, but during the base, school, and PM peak periods, Route 33 headways could be shortened (see also "Level of Service" analysis, below) without deploying additional vehicles. By doing so, both routes could operate at 25 minute headways during the AM peak, 45 minutes during the mid-day, and 25 minutes in both the school and PM peak periods.

Figure 4-6  
Simplified Turnaround at Outer End of Route 33



## LEVEL OF SERVICE

### Route 24

There is excess capacity on Route 24 throughout the day. Standing loads were observed on only one weekday trip (7:00 am inbound), and average peak loads were less than 60 percent of seated capacity during all periods. However, because the route's round trip running time results in a cycle time of 40 to 50 minutes throughout most of the day, and no more than two vehicles are deployed on the route, there is very little flexibility in setting headways. As discussed in the following paragraphs, while the existing headways are shorter than warranted by demand, headway increases large enough to save one vehicle would result in large increases in passenger wait time for relatively modest savings in vehicle hours.

**AM Peak** All AM peak service is provided with Route 24.0 at 20 minute headways. The route's cycle time is 40 minutes requiring two vehicles.

Peak loads in the inbound direction range from six to 51 passengers, with a period average of 25 and a peak half-hour average of 46 (for the 6:40 and 7:00 am trips). Without an extension to Ashmont, given the 40 minute cycle time, one vehicle could be saved only by increasing headways to 40 minutes. With an increase of this magnitude, a ridership loss of 145 riders, or approximately 27 percent, would be expected. For the remaining 400 riders, their average wait time would be increased by 10 minutes per trip, or a total of 66.9 hours. The service cutback would save only three vehicle hours, meaning that passenger wait time would be increased by 22 hours for each vehicle hour saved.

**Base** During the base period, service operates with a 50 minute cycle time. One vehicle is deployed.

On the Route 24.3 variation, actual running times are significantly lower than scheduled, at 35 minutes versus 41 minutes. In addition, the running time variability of the route is low, so that only three minutes of layover time is needed. Based on these characteristics, service could be re-scheduled for a 40 minute cycle time that included five minutes of layover time, thus reducing headways from 50 minutes to 40 minutes. This would reduce wait times for 250 existing riders by 23 hours per day, and should also attract up to 30 new riders. Because no additional vehicle hours would be involved, this change would cost only \$2,300 per year, and be offset by a nearly equal farebox revenue increase of \$2,100 per year.

**School** During the school period, service is provided at 30 minute headways. Two vehicles are deployed throughout the period.

As with the base period, a higher level of service could be provided by rescheduling the two existing vehicles with a 40 minute cycle time. Route 24.0 running times could be rescheduled to 12 minutes inbound and 21 minutes outbound, with seven minutes layover time. This change would reduce wait times for current riders by 11.1 hours per day and attract 25 new riders. The cost would be \$2,100 per year, most of which would be offset by a revenue increase of \$1,900 per year.

To reduce vehicle requirements from two to one would require headways to be increased to 40 minutes. This would save fewer than two vehicle hours per day, while increasing passenger wait time by 24.3 hours, or 12.2 hours for each vehicle hour saved. The reduction would also result in the loss of approximately 65 daily trips.

**PM Peak** As in the school period, service could be operated with a 40 minute cycle time, allowing headways to be reduced to 20 minutes. This would reduce wait time for existing riders by 10 hours per day and increase



ridership by 25 trips per day. The cost impact would be the same as in the school period.

Also as in the school period, an increase in headways to 40 minutes would be needed to reduce vehicle requirements by one. This doubling of headways would save only 2.2 vehicle hours, but would increase passenger wait time by 21.6 hours, or 15.4 hours per vehicle hour saved. Ridership would also decrease by approximately 28 percent, or 60 trips per day.

Evening PM peak headways of 25 to 30 minutes continue into the evening period until 7:30 pm. After that time, Route 24.2 service begins which also operates beyond Mattapan to Ashmont as Route 30. Service is provided at 60 minute headways until the end of service shortly after 1:00 am. Evening service is also lightly utilized, with peak loads of 19 passengers or less. Based on these loads, and observed running times, these headways are appropriate.

### Route 27

Route 27 operates at 30 minute headways throughout the day. As stated above, during the mid-day, Route 27 service is provided by an extension of Route 30 (as Route 30.1), and during the evening, both Routes 24 and 30 are extended to Ashmont to provide Route 27 service. Both Routes 24 and 30 operate at 60 minute evening headways, so that the combined service results in 30 minute headways. During other periods, including both peaks, there is no interlining, and one vehicle operates back and forth between Mattapan and Ashmont.

The route is scheduled for round trip running times of 22 to 23 minutes, with seven to eight minutes for layovers, resulting in cycle time to running time ratios of 1.30 to 1.36. Actual observed running times, however, were slightly lower, averaging from 19 to 22 minutes, leaving eight to eleven minutes of layover time and resulting in cycle time to running time ratios of 1.36 to 1.50. In addition, because there is so little running time variability, most of the scheduled layover is not needed. However, due to the mid-day and evening interlining, short running times and low vehicle requirements, there is little flexibility in changing schedules.

This is especially true during the evening, where loads are very low, averaging 11 passengers per trip on outbound trips, and only four passengers per trip on inbound trips. Based on these ridership levels, 60 minute headways would be warranted,<sup>18</sup> but because of the way service is structured,

---

<sup>18</sup>Sixty minute headways would save three vehicle hours and increase passenger wait time by 32 hours, or 10.7 hours per hour of vehicle time saved.

no vehicle savings could be achieved. On both Routes 24.2 and 30.1, the operation of service on either route only as far as Mattapan would still require one vehicle on each route, thus resulting in long layover times.

### Route 33

All Route 33 service operates well below capacity. On all variations throughout the day, the highest load observed on any trip was 39 passengers, and peak period peak loads average 22 in the AM peak and 20 in the PM peak. However, throughout the day, only one or two vehicles are deployed on the route, and as with Route 24, the 50 percent cut in service that would result in taking one vehicle from the route would result in large increases in passenger wait time and ridership losses relative to the operating savings that would result.

Although shorter headways are not needed, they could be provided within existing vehicle deployment levels. During all periods, actual running times average lower than scheduled times to the extent that cycle times could be reduced from 60 minutes to 45 to 50 minutes. This would allow headways to be reduced from 30 to 60 minutes to 25 to 45 minutes (see Table 4-19).

**Table 4-19**  
**Route 33.5 and 33.6 Schedule Statistics**

	<u>Route 33.5</u>			<u>Route 33.6</u>	
	<u>3:00am- 6:59am</u>	<u>7:00am- 8:59am</u>	<u>9:00am- 1:59pm</u>	<u>2:00pm- 5:59pm</u>	<u>6:00pm- 8:29pm</u>
<u>Inbound</u>					
Scheduled Run Time (min)	22	26	25	25	27
Observed Run Time (min)	23	20	19	21	17
STD of Obs Run Times (min)	--	1.2	1.2	2.3	--
<u>Outbound</u>					
Scheduled Run Time (min)	22	26	24	24	24
Observed Run Time (min)	19	21	21	21	18
STD of Obs Run Times (min)	0.7	2.3	1.6	3.0	0.7
<u>Round Trip</u>					
Scheduled Cycle Time (min)	60	60	60	60	60
Sched RT Run Time (min)	44	52	49	49	51
Obs RT Run Time (min)	42	41	40	41	35
Scheduled Recovery Time	16	8	11	11	9
Observed Recovery Time	19	20	20	19	25
STD * 1.5 (min)	--	5	4	8	--
Optimum Cycle Time	--	46	44	49	--

**AM Peak** During the AM peak, service is provided with variation 33.5. For most of the period, service is provided with two vehicles at 30 minute headways, but with one extra inbound trip at 7:00 am. Although all trips are below capacity at current headways, the additional trip is needed, and without it, the peak load on the 7:10 trip would increase from 39 to 54.

However, actual running times during the AM peak average 42 minutes, as compared to a scheduled round trip running time of 51 minutes. The running time variability of the route is also fairly low, so that only five minutes of total recovery time is needed. This would allow the cycle time to be reduced to 50 minutes, and headways be reduced to 25 minutes. With 25 minute headways, the additional trip could be eliminated, while still holding peak loads to 45 or less.

**Base** Service is operated with variation 33.5 with one vehicle deployed at 60 minute headways. As in the AM peak, actual running times are lower than scheduled in the base period, at 40 minutes compared to a scheduled 49 minutes. Running time variability is also low so that only four minutes of recovery time would be needed per round trip. This would allow the cycle time to be reduced from 60 minutes to 45 minutes and correspondingly, headways to also be reduced from 60 minutes to 45 minutes. This, in turn, would result in a passenger increase of approximately 50 passengers per day.

**School and PM Peak** During the school and PM peak periods, service is operated with variation 33.6. Two vehicles are deployed to provide service at 30 minute headways.

Running times are shorter than scheduled during these periods also. Actual running times average 41 minutes, compared to the 49 minutes scheduled, and eight minutes of recovery time is needed for each round trip. As in the AM peak, cycle times could be reduced to 50 minutes, and the two vehicles deployed on the route used to provide 25 minute headways. In the school period, this should result in a ridership increase of 25 passengers; in the PM peak the increase should be 10 passengers.

## **RELIABILITY**

### **Route 24**

Route 24 service is generally reliable. No trips were observed departing more than five minutes late, but three of the first ten AM peak outbound Route 24.0 trips were between three and five minutes late. In addition, three of the first 11 outbound trips on Route 24.0 left more than two minutes early. The cause of these off-schedule departures could not be definitely determined.



However, based on observed running times, some improvement may be possible by increasing inbound running times by one minute and decreasing outbound running times by one minute. As shown in Table 4-20, this change would bring scheduled times in line with observed averages, and possibly relieve pressure on drivers to leave early. Scheduled cycle and layover times are properly scheduled and should remain as they are.

**Table 4-20**  
**Route 24.0 Schedule Statistics**

	3:00am- 6:59am	7:00am- 8:59am	9:00am- 1:59pm	2:00pm- 5:59pm	6:00pm- 8:29pm
<u><i>Inbound</i></u>					
Scheduled Run Time (min)	12	12	13	16	11
Observed Run Time (min)	11	13	15	12	12
STD of Obs Run Times (min)	2.6	1.3	0.7	2.1	2.1
<u><i>Outbound</i></u>					
Scheduled Run Time (min)	17	21	21	22	18
Observed Run Time (min)	16	20	17	21	19
STD of Obs Run Times (min)	2.8	3.8	--	1.7	1.3
<u><i>Round Trip</i></u>					
Scheduled Cycle Time (min)	40	40	43	50	50
Sched RT Run Time (min)	29	33	34	38	29
Obs RT Run Time (min)	27	33	32	33	31
Scheduled Recovery Time	11	7	9	12	21
Observed Recovery Time	14	7	12	17	19
STD * 1.5 (min)	8	8	--	6	5
Optimum Cycle Time	35	41	43	39	36

For the rest of the day, there were no observed reliability problems on any Route 24 trips.

### Route 27

Throughout the day, Route 27 was observed to be extremely reliable and not prone to traffic delays. No adjustments with respect to reliability are necessary.

### Route 33

With the excess running time provided on Route 33 trips, there are no problems with late departures on Route 33. However, as compared with scheduled arrival times, a large majority of all trips arrived more than five minutes early at their destination. The excess recovery time resulting from

the early departures would be eliminated by the level of service changes discussed in the preceding section.

## 5. Route 30

Route 30: Roslindale Square - Mattapan

### ROUTE PROFILE

Route 30 operates between Roslindale Square and Mattapan Station (see Figure 5-1). The service area is primarily residential, but there is heavy commercial development at both ends and some commercial development along the route on Cummins Highway.

During the mid-day and evening (between 9:30 am and noon, and from 7:05 pm until 12:30 am), the route also operates as Route 30.1 (signed as Route 27) through to Ashmont. Twenty minute headways are provided in the peak periods, 30 minutes mid-day, and 60 minutes in the evening (see Table 5-1). Total ridership on the two variations in the Spring of 1986 was 2,100 trips per weekday. Of this ridership, approximately 240 is attributable to the "Route 27" portion. In addition, since that time, ridechecks performed in June 1988 indicate ridership of 13 percent lower than Spring 1986 at approximately 1,835 trips per day. Most, if not all, of the difference is likely due to normally lower summer ridership. Pointchecks conducted in October 1987 indicated ridership levels essentially the same as Spring 1986 (see Table 5-2).

**Table 5-1**  
**Route 30 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1987): 5:15 am - 6:45 pm

	Average One-Way <u>Length</u>	One- Way <u>Trips</u>	<u>Avg Headway (Mins-Peak Dir)</u>							<u>All Day</u>	
			<u>EA</u>	<u>AM</u>	<u>Base</u>	<u>Sch</u>	<u>PM</u>	<u>Eve</u>	<u>VSM</u>	<u>VSH</u>	
<i>Spring 1987</i>											
Rt 30.0	2.5	64	2T	19	20	20	20	4T	160.0	20.5	
Rt 30.1	4.7	<u>24</u>	--	--	<u>30</u>	--	--	<u>60</u>	<u>112.8</u>	<u>12.0</u>	
<b>Total/Avg</b>		88	--	19	27	20	20	60	272.8	32.5	

*Fall 1987*

No changes have occurred.



Figure 5-1  
Route 30: Roslindale Square - Mattapan

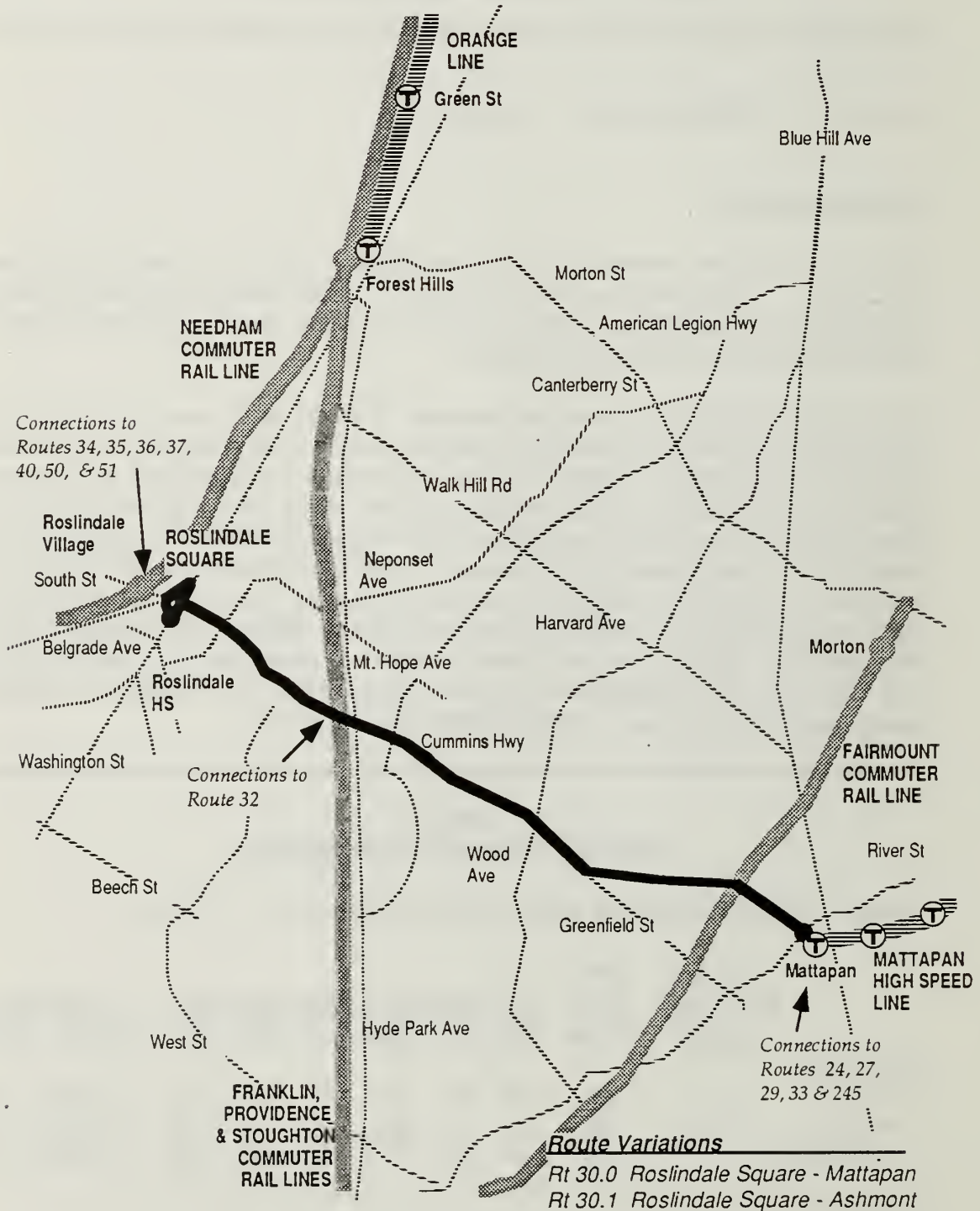


Table 5-2  
Route 30 Weekday Ridership and Productivity Statistics

	Weekday Boardings	Boardings/VSM							Boardings/ VSH All Day
		Early AM	AM Peak	Base	Sch	PM Peak	Eve	All Day	
Spring 1986									
Rt 30.0	1,565	1.4	12.3	7.3	12.2	11.9	5.4	9.8	76.3
Rt 30.1	<u>535</u>	<u>--</u>	<u>--</u>	<u>7.1</u>	<u>--</u>	<u>--</u>	<u>2.4</u>	<u>4.7</u>	<u>44.5</u>
Total/Avg	2,100	1.4	12.3	7.2	12.2	11.9	2.9	7.7	64.6
Fall 1987									
Total/Avg	2,115							7.8	65.0
Summer 1988									
Total/Avg	1,835							6.7	56.5

Percent of passengers 65 or older (Spring 1986): 6%

Percent without a car available for trip (Spring 1986): 81%

Spring 1986 peak load points: Inbound: Cummins Hwy @ Hebron St.

Outbound: Cummins Hwy @ Washington St.

Average peak loads at these ridership levels are fairly low, at 27 passengers or less during peak periods. The highest average peak loads occur during the school peak outbound, at 31 passengers. Standing loads were observed on only three trips, with a highest single peak load of 53 passengers in the AM peak inbound.

Ridership is balanced fairly evenly between directions with nearly as many trips destined towards Roslindale Square as towards Mattapan during most periods. This balance does not appear to have been significantly affected by the opening of the new Orange Line. In 1986, during the AM peak, 54 percent of all trips were in the outbound direction towards Mattapan, while 46 percent were towards Roslindale Square. As of June 1988, the split has changed only slightly to 55 percent/45 percent. In the PM peak, the split between directions remains an even 50 percent.

Nearly 60 percent, or 1,250, of 2,100 daily passenger trips made on Route 30 in 1986 involved at least one transfer with another MBTA route. As shown in more detail in Table 5-3, most transfers (56 percent) are made at the Roslindale Square end of the route, with the remaining 46 percent made at Mattapan or Ashmont. Of the Roslindale Square transfers, approximately 245 are for the purpose of connecting with the Orange Line at Forest Hills. As

would be expected, more transfers to the rapid transit system are made at Mattapan and Ashmont, where direct connections can be made. At these two stations, 485 transfers were made with the Mattapan High Speed Line and the Red Line in 1986.

**Table 5-3**  
**Route 30 - Weekday Transfers with Other Routes**

<u>Transfers @ Roslindale Square</u>		<u>Transfers @ Mattapan/Ashmont</u>	
<u>To/From</u>	<u>No. of Transfers</u>	<u>To/From</u>	<u>No. of Transfers</u>
Route 34	120	Route 22	35
Route 35	70	Route 27	80
Route 36	80	Route 29	255
Route 37	30	Route 245	40
Route 40	40		445
Route 51	15		
	375		

(Transfers to other or unidentified routes = 245)

With the high number of bus transfers, the most heavily utilized stops are at or near the ends of the line where the transfers are made. There are relatively high levels of activity at intermediate stops as well, but heavier activity occurs along the Mattapan half of the route.

Most Route 30 riders are residents of Mattapan (46 percent), Roslindale (23 percent), Dorchester (13 percent), or Hyde Park (11 percent). For work and school trips, which account for 44 percent of Route 30 trips, the largest number are made to downtown Boston (35 percent), followed by Roslindale (18 percent), Mattapan (12 percent), and Dorchester (10 percent).

There is a high level of transit dependency on Route 30, although lower than on Routes 24 and 27. Fewer than 18 percent of the route's riders are younger than 18 or 65 or older, but 81 percent do not have a car available for their trip and 53 percent do not have a driver's license. Thirty-eight percent of Route 30's riders have an annual household income of less than \$20,000, and 68 percent use the MBTA five to seven days per week.



## SERVICE COVERAGE

### Overall Assessment

Route 30 shares many characteristics with Routes 24 and 33, the two other SOUTHBus routes that provide feeder service to Mattapan. Route 30 is also a short route that serves a predominately residential area, with most residents working outside of the immediate area. The largest numbers of work trips are made to downtown Boston, the Back Bay (including Park Square), and the Fenway/Parker Hill area, which are served only indirectly by Route 30. As with Routes 24 and 33, two or more transfers are usually required (one with the Mattapan High Speed Line, one with the Red Line, and often another transfer to the Green Line at Park Street) to make these trips. Also, as shown in Table 5-4, more trips are made to areas served by the Orange Line (Jamaica Plain, Roxbury, the Back Bay and Park Square) than to areas served by the Red Line (Dorchester).

---

Table 5-4  
Weekday Work Trips from Areas Served by Route 30  
(Source: 1980 US Census)

<u>From Area Served by:</u>	<u>To:</u>				
	<u>Jamaica Plain/ Roxbury</u>	<u>Back Bay/ Park Square</u>	<u>Dorchester</u>	<u>Financial Dist/ Gov't Ctr</u>	<u>Fenway/ Parker Hill</u>
Route 30	113	216	109	359	183

---

Based on these work trip patterns, Route 30 would better match existing demand if it served Forest Hills. This service could be provided by extending the route from Roslindale Square to Forest Hills. This extension was also requested by residents along the route during the BTD's Community Transit Workshops and the BTD ultimately recommended a direct bus connection between Mattapan Square and Forest Hills.

Improved connections could also be provided with the Red Line by extending the route to Ashmont. However, extending Route 30 to Ashmont in addition to Routes 24 and 33, as discussed in Chapter 3, would result in an oversupply of service between Mattapan and Ashmont. Furthermore, since most Route 30 downtown Boston-bound riders would be as well served by direct connections to the Orange Line, both extensions would not be needed.

### Extension of Route 30 to Forest Hills

At present, the only bus connections between Mattapan Square and the Orange Line are via Routes 28 and 29 to the Jackson Square and Ruggles stations, where trip times between Mattapan and the Orange Line can be as long as 41 minutes. An extension of Route 30 could reduce the travel time to the Orange Line to 18 to 24 minutes.

For existing Route 30 riders, an extension to Forest Hills would provide faster connections to Boston for all downtown Boston-bound riders except those within approximately three-quarters of a mile of Mattapan. It would also provide faster connections for all Jamaica Plain, Roxbury, South End, Back Bay and Park Square-bound riders. Further, it would eliminate one to two transfers. Up to 400, or 19 percent, of Route 30's existing riders would benefit from the extension.

The most direct routing of a Route 30 extension to Forest Hills would be from Cummins Highway to Hyde Park Avenue to Washington Street. However, this alignment would bypass Roslindale Square, which is the origin or destination of 44 percent of Route 30's trips. Therefore, to continue to serve Roslindale Square, service to Forest Hills would have to be operated as an extension of the existing route from Roslindale Square.

Ridership/Travel Time Impacts Time savings for existing Route 30 riders would be relatively large. At present, due to the need to transfer two or three times to travel to downtown Boston, peak period travel times, including transfer and wait times, can be as high as 56 minutes (see Table 5-5). To the Back Bay and Park Square areas, total trip times, including transfer and wait times, could be reduced by 24 to 27 minutes, to 37 minutes or less. The travel time savings would largely be the result of a more direct routing and the elimination of two transfers (one with the Mattapan High Speed Line and one with the Green Line at Downtown Crossing). To the Financial District and Government Center, peak period travel times could be reduced from approximately 54 minutes to 40 minutes, and one transfer would still be eliminated.

For all downtown Boston-bound riders, the total time savings would amount to 105 hours per weekday. If a typical value of five minutes is placed on each transfer that is eliminated, the equivalent time savings would increase to 145 hours. Also, additional time savings would accrue from riders that would shift from Routes 28 and 29. However, since detailed ridership data for these routes are not available subsequent to the opening of the new Orange Line (and the initiation of Route 28), it is not possible to estimate the shift that would occur, or probable savings. In addition to the shift from Routes 28 and 29, the extension would also attract approximately 55 new trips per weekday.

**Table 5-5**  
**Travel Times to Downtown Boston from Route 30's Service Area**

	Early <u>AM</u>	AM <u>Peak</u>	<u>Base</u>	<u>School</u>	PM <u>Peak</u>	<u>Evening</u>
<u>To/From Financial District/Government Center</u>						
•Existing Service						
Rt 30 Wait Time <sup>19</sup>	9	10	14	10	10	30
Rt 30 Median Travel Time <sup>20</sup>	6	8	8	8	7	7
MHSL <sup>21</sup> Transfer Time	9	3	5	3	3	7
MHSL Travel Time	9	10	10	10	10	9
Red Line Transfer Time	8	5	7	7	5	7
Red Line Travel Time <sup>22</sup>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>	<u>18</u>
<b>Total</b>	<b>59</b>	<b>54</b>	<b>62</b>	<b>56</b>	<b>53</b>	<b>78</b>
•w/Route 30 Extension						
Rt 30 Wait Time	13	10	15	10	10	25
Rt 30 Median Travel Time <sup>23</sup>	9	9	12	12	11	10
Orange Line Transfer Time	8	3	5	5	3	8
Orange Line Travel Time	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>	<u>17</u>
<b>Total</b>	<b>47</b>	<b>39</b>	<b>49</b>	<b>44</b>	<b>41</b>	<b>60</b>
•Savings						
Minutes	12	15	13	12	12	18
Percent	20%	28%	21%	21%	29%	23%
<u>To/From Back Bay/Park Square</u>						
•Existing Service (same as above plus:)						
Green Line Transfer Time	2	2	2	2	2	2
Green Line Travel Time <sup>24</sup>	<u>5</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>6</u>	<u>5</u>
<b>Total</b>	<b>66</b>	<b>62</b>	<b>70</b>	<b>64</b>	<b>61</b>	<b>85</b>
•w/Route 30 Extension (same as above minus:)						
Shorter Orange Line						
Travel Time <sup>25</sup>	<u>-4</u>	<u>-4</u>	<u>-4</u>	<u>-4</u>	<u>-4</u>	<u>-4</u>
<b>Total</b>	<b>43</b>	<b>35</b>	<b>45</b>	<b>40</b>	<b>37</b>	<b>56</b>
•Savings						
Minutes	23	27	25	24	24	29
Percent	35%	44%	36%	38%	39%	34%

<sup>19</sup>Wait times are calculated at 50% of the headway. Transfer times include 50% of the headway plus a one minute walk time between services.

<sup>20</sup>To Mattapan.

<sup>21</sup>Mattapan High Speed Line.

<sup>22</sup>Red Line and Orange Line travel times are to Downtown Crossing.

<sup>23</sup>To Forest Hills.

<sup>24</sup>From Park Street to Copley.

<sup>25</sup>To Back Bay Station.



The extension would also cause a shift in ridership away from the balanced flow between directions that now exists to an orientation to and from Forest Hills. Up to 400 daily trips that are now made to and from Mattapan would shift to Forest Hills, increasing flows in that direction by nearly 40 percent. Ridership to and from Mattapan would be reduced by an equal amount. Including the impact of the new trips as well, this would mean that peak loads in the AM peak towards Roslindale Square and Forest Hills would increase from an average of 23 to 33, and loads in the peak half-hour from 39 to 56. In the PM peak, average peak loads would increase from 25 to 36, and peak half-hour loads would increase from 35 to 49. These figures indicate that existing headways would be adequate to handle ridership on an extension to Forest Hills, with the exception of the AM peak half-hour, where an additional trip would be required.

**Level of Service on Extended Service** The operation of the extension would add one and one-quarter miles and four to eight minutes running time to the route in each direction. Including layover time, cycle times would increase by 5 to 20 minutes, to 45 to 60 minutes (see Table 5-6). With these cycle times, essentially the same level of service could be provided by adding one vehicle to the route during peak periods. During the base and evening periods, an additional vehicle would not be needed if the Route 24 and Route 27 combination discussed above were implemented. In this case, the additional service now provided on Route 30.1 between Mattapan and Ashmont would be shifted to between Forest Hills and Roslindale Square.

**Table 5-6**  
**Route 30 Extension to Forest Hills**  
**Schedule Statistics (in minutes)**

	3:00am- 6:59am	7:00am- 8:59am	9:00am- 1:59pm	2:00pm- 5:59pm	6:00pm- 8:29pm	8:30pm- 2:59am
<i>Existing Route 30</i>						
Round Trip Run Time	22	32	29	29	26	25
Req'd Layover Time	6	10	7	6	3	4
<i>Extension</i>						
Round Trip Run Time	12	14	17	18	16	15
Req'd Layover Time	3	3	6	8	6	5
<i>Total Route</i>						
Round Trip Run Time	34	36	46	47	42	40
Req'd Layover Time	9	13	13	14	9	9
<i>Proposed Headways</i>						
Vehicle Requirement	25	20	30	30-20	25-50	50
Cycle Time	2	3	2	2-3	2-1	1
	50	60	60	60	50	50

Based on the schedule shown in Table 5-6, the additional running time between Roslindale Square and Forest Hills would add 15.7 hours of vehicle time per weekday on Route 30. For existing Route 30 passengers, including the value of the eliminated transfer, there would be 9.3 hours of passenger time saved for each additional hour of vehicle time deployed. (Including the time savings of existing Route 28 and 29 riders who would shift to Route 30, the figure would be higher. The number of these riders is unknown.)

Unlike the elimination of the transfer between Routes 24 and 27, the elimination of a transfer with the Mattapan High Speed Line would not result in a fare loss since there is no transfer charge between the Mattapan High Speed Line and the Red Line. Therefore, transfer fares collected at Ashmont would instead be collected at Forest Hills, and the only fare impact would be the additional revenue collected from new riders. Based on Route 30's average fare of 36 cents, 55 new weekday riders would generate \$5,000 in new revenue. The cost of the extension would be \$127,700 per year.

#### Coordination of Route 30 with Route 27

During the mid-day and evening periods, Routes 30 and 27 are coordinated as a consequence of being through-routed. During other periods, they are not coordinated or through-routed. With the revised headways proposed for an extended Route 30, Route 30 headways would be different than Route 27 headways during all periods (and different than headways on extensions of Routes 24 or 33, as discussed in Chapter 3), so that these services would no longer be coordinated.

To continue the coordination between the routes would require that headways on an extended Route 30 be increased by approximately five minutes during most periods. However, very few riders would be affected by the lack of coordination (less than 10 per day), while 535 riders would be adversely affected by longer Route 30 headways.

#### LEVEL OF SERVICE

Route 30 operates throughout the day at 20 to 30 minute headways. AM peak headways average 19 minutes, base headways average 27 minutes, school and PM peak headways average 20 minutes, and evening headways are 60 minutes. During all periods, there is an oversupply of service. During peak periods, peak loads average 27 or less, and throughout the day, standing loads were observed on only three trips.

Based on present service configurations, there is little flexibility for alternative scheduling. Throughout the day, the only way to save one

vehicle would be to increase headways from 20 minutes to 40 minutes. This doubling of headways would result in a ridership loss of approximately 26 percent.

Based on the informal standard that service cuts should not be implemented if they result in more than 10 to 15 hours of additional passenger wait time for each hour of vehicle time saved, the longer headway should only be considered in the base period (see Table 5-7). However, for much of the base period (between 9:30 am and noon), service is provided by Route 30.1 at 30 minute headways. As a result, 40 minute headways on Route 30.0 would operate for only a short period and savings would be relatively small, at \$26,600 per year. During the middle of the base period, 30 minute headways should continue to be provided on Route 30.1 (since a doubling of Route 30.1 headways to 60 minutes would result in an increase of 24.5 passenger hours of wait time for each hour of vehicle time saved).

---

**Table 5-7**  
**Impacts of Headway Increases on Route 30**

	<u>AM</u> <u>Peak</u>	<u>Base</u>	<u>School</u>	<u>PM</u> <u>Peak</u>
<u>Route 30.0</u>				
Current Headway (min)	19	20	20	20
Alternative Headway (min)	40	40	40	40
Increase in Pax Wait Time (hrs)	65.5	29	44.8	43.7
Vehicle Hour Savings	5.8	4.3	4.0	4.0
Inc Pax Wait Time/VSH Savings	23.8	13.4	22.2	21.8
<u>Route 30.1</u>				
Current Headway (min)	--	30	--	--
Alternative Headway (min)	--	60	--	--
Increase in Pax Wait Time (hrs)	--	73.4	--	--
Vehicle Hour Savings	--	6	--	--
Inc Pax Wait Time/VSH Savings	--	24.5	--	--

---

Therefore, for the base period as a whole, increasing Route 30.0 headways to 40 minutes would result in shorter headways in the middle of the period than at the fringes of the period. These headways would be somewhat counter-intuitive to riders, considering that it is more usual for the opposite to be the case. However, ridership is heaviest during the middle of the period, so that these headways would be warranted based on existing demand.



## RELIABILITY

Reliability on Route 30 is generally good, but there were a number of observed off-schedule departures scattered throughout the day. Those occurring in the AM peak appear to be attributable to increases in running times; the causes of other off-schedule trips could not be determined.

In the AM peak, running times now exceed book times to the extent that some trips fall more than five minutes behind schedule along the route. In the inbound direction, observed running times average three minutes longer than the 14 minute book time, and in the outbound direction, four minutes longer than the 11 minute book time. Overall, round trip running times now average 32 minutes, or seven minutes longer than the scheduled 25 minutes. In addition, the route is prone to traffic delays in Mattapan Square in the AM peak, so that ten minutes of recovery is theoretically needed to insure 90 percent on-time performance.

However, to provide 10 minutes of recovery time would require that cycle times be increased from 37 minutes to 42 minutes. This, in turn, would require either one additional vehicle or longer headways. Since late arrivals are not now causing late departures on the following trips, there is not yet a compelling reason to make either type of change. However, current longer running times indicate that traffic conditions are worsening, so that the route's performance should be monitored.



---

## 6. Route 32

---

*Route 32: Wolcott Square/Cleary Square - Forest Hills via Cleary Square*

### ROUTE PROFILE

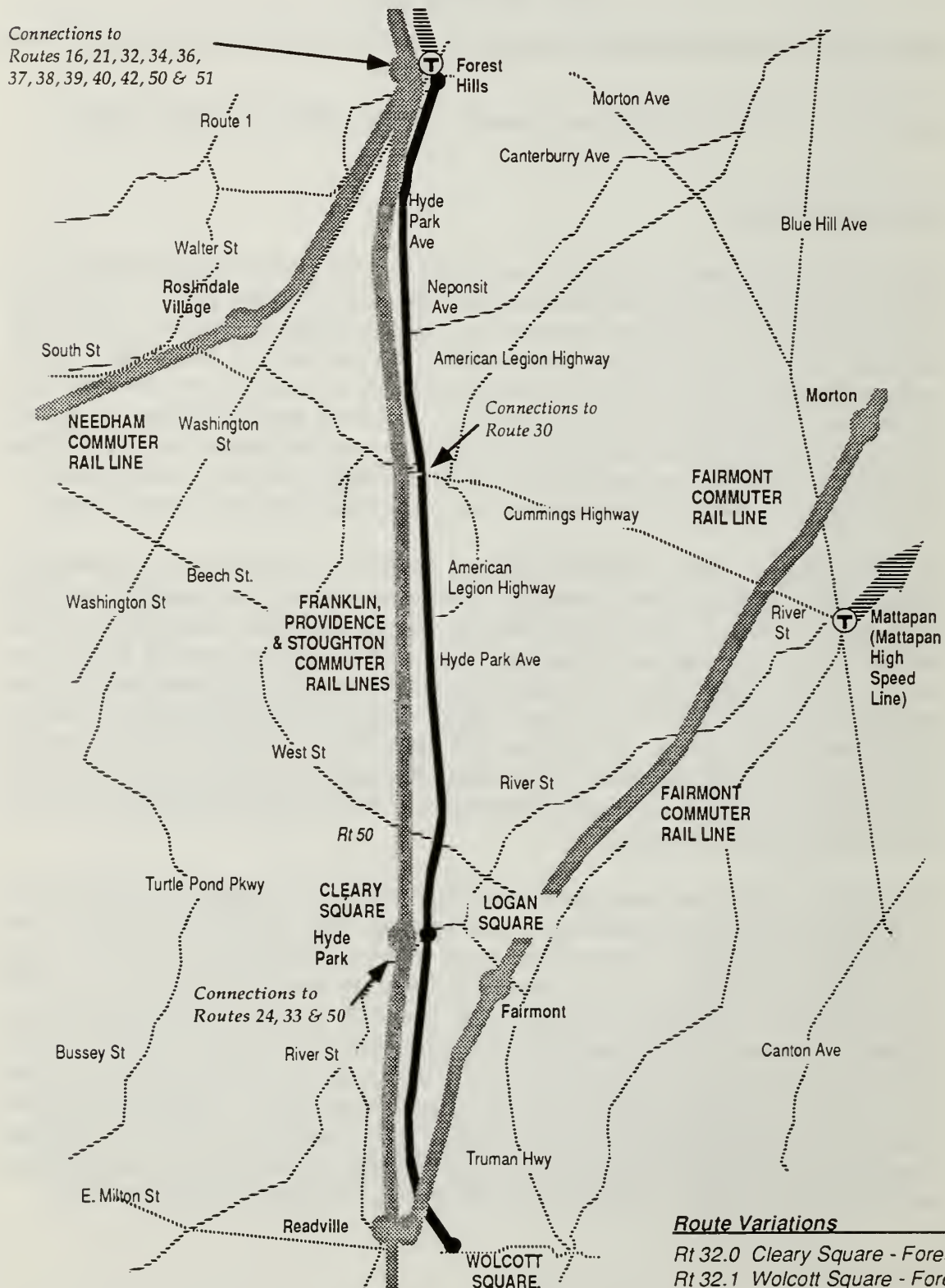
Route 32.0 and Route 32.1 operate between Cleary Square and Forest Hills and Wolcott Square and Forest Hills, respectively (see Figure 4-1). Route 32.1 operates between Wolcott Square and Forest Hills throughout the day between 4:45 am and 1:22 am. Route 32.0 is a short turn of Route 32.1, which operates between Cleary Square and Forest Hills in the peak periods and their fringes to supplement Route 32.1 service. Although both variations of Route 32 provide local service along Hyde Park Avenue, the major function of this route is to provide connections with the Orange Line and other buses at Forest Hills: 76 percent of all trips on this route begin or end at Forest Hills.

In the Spring of 1986, combined service on the two variations provided six minute headways in peak periods, 12 minutes during the mid-day, and 30 minutes for most of the evening period. Since that time, AM peak service levels have been increased while mid-day and PM-peak services have been reduced. As of Fall 1987, six Route 32.0 trips had been added between 7:37 am and 8:47 am (see Table 6-1). Five of these additional trips are inbound trips, which reduce headways during the AM peak from six minutes to as low as two minutes. During the base, school and PM peak periods, a total of 19 trips have been eliminated, increasing headways in each of these periods by two to three minutes (see Table 6-2).

The Spring 1986 ridechecks show ridership on the two variations of Route 32 at 5,450 trips per day, making it the second most heavily utilized in the SOUTHBus corridor. Since that time, MBTA pointchecks indicate that boardings and alightings at Forest Hills have increased 33 percent, or 1,375 trips per day (see Table 6-3) through the Fall of 1987. However, since pointchecks were only conducted at Forest Hills, it is unclear whether this increase has occurred throughout the route or only at Forest Hills where new trips have been attracted by the new Orange Line. Assuming that the increase is attributable to the new Orange Line, and that other ridership on the line has remained stable (as on SOUTHBus routes that do not connect with the Orange Line), current total ridership is estimated at 6,825 per day.



**Figure 6-1**  
**Route 32: Wolcott Square/Cleary Square - Forest Hills**



**Table 6-1**  
**Route 32 Service Changes - Spring 1986 vs. Fall 1987**

	Changes in One-Way Bus Trips Operated						
	Early AM	AM Peak	Base	PM School	Peak	Evening	All Day
<u>Route 32.0</u>							
Inbound	0	+5	+1	-1	-1	0	+4
Outbound	<u>0</u>	<u>+1</u>	<u>0</u>	<u>0</u>	<u>-2</u>	<u>0</u>	<u>-1</u>
Both Directions	0	+6	+1	-1	-3	0	+3
<u>Route 32.1</u>							
Inbound	0	0	-5	-1	-1	-1	-8
Outbound	<u>0</u>	<u>0</u>	<u>-5</u>	<u>-1</u>	<u>-2</u>	<u>0</u>	<u>-8</u>
Both Directions	0	0	-10	-2	-3	-1	-16
<u>Total</u>							
Inbound	0	+5	-4	-2	-2	-1	-4
Outbound	<u>0</u>	<u>+1</u>	<u>-5</u>	<u>-1</u>	<u>-4</u>	<u>0</u>	<u>-9</u>
Both Directions	0	+6	-9	-3	-6	-1	-13

**Table 6-2**  
**Route 32 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1987): 4:45 am - 1:22 am

	Average One-Way Length	One- Way Trips	Avg Headway (Min-Peak Dir)							All Day	
			EA	AM	Base	Sch	PM	Eve		VSM	VSH
<u>Spring 1986</u>											
Rt 32.0	3.2	57	--	12	--	1T	13	3T		182.4	20.0
Rt 32.1	4.7	<u>162</u>	<u>24</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>28</u>		<u>745.2</u>	<u>64.8</u>
Total/Avg		219	24	6	12	12	6	23		927.6	84.7
<u>Fall 1987</u>											
Rt 32.0	3.2	60	--	9	1T	--	14	2T		192.0	21.1
Rt 32.1	4.7	<u>146</u>	<u>20</u>	<u>12</u>	<u>15</u>	<u>15</u>	<u>16</u>	<u>28</u>		<u>686.2</u>	<u>58.3</u>
Total/Avg		206	20	5	15	15	8	23		878.2	79.4
<u>Change</u>											
		-6%	-17%	-17%	+25%	+17%	+33%	0%		-5%	+6%

**Table 6-3**  
**Route 32 Weekday Ridership and Productivity Statistics**

		Boardings/VSM							Boardings/VSH
	Weekday Boardings	Early AM	AM Peak	Base	Sch	PM Peak	Eve	All Day	VSH All Day
Spring 1986									
Rt 32.0	1,175	0.9	7.1	--	9.8	6.2	3.6	6.4	58.9
Rt 32.1	<u>4,275</u>	<u>3.7</u>	<u>7.7</u>	<u>5.3</u>	<u>9.1</u>	<u>5.8</u>	<u>3.2</u>	<u>5.7</u>	<u>66.0</u>
Total/Avg	5,450	3.3	7.5	5.3	9.2	6.0	3.2	5.9	64.3
Fall 1987									
Total/Avg	6,825							7.8	86.0
Change	+25%							+32%	+34%

Percent of passengers 65 or older (Spring 1986): 9.4%

Percent without a car available for trip (Spring 1986): 76.3%

Spring 1986 peak load points: Inbound: Hyde Park Avenue @  
 Northbourne Road  
 Outbound: Hyde Park Avenue opposite  
 Patten Street

Based on the 1986 passenger survey data, most Route 32 riders were from Hyde Park (75 percent) and Roslindale (12 percent), and most trips were to Downtown Boston (39 percent). For work and school trip purposes, the percent of trips from Hyde Park was slightly lower, at 61 percent, while the number of trips to Boston was higher, at 49 percent. Since 1986, based on the additional ridership to and from Forest Hills, it is likely that the number of trips to Boston has increased as a percent of total trips.

As with most of the radial routes, a large majority of riders walks directly to the bus at the outer end, and transfers to rapid transit or another bus at the inner end of the route. On Route 32, in 1986, 88 percent walked directly to the route at the outer end, while at the inner end of the route (towards Forest Hills), 40 percent transferred to or from the Orange Line and 29 percent transferred to or from another bus. Again, with the increase in Forest Hills trips, it is likely that the number of Orange Line transfers has increased as well. Of 1,900 daily bus transfers (in 1986), 1,040, or 55 percent, were with Route 39. Other transfers at Forest Hills were with Route 34 (165 per day), Route 35 (135), Route 30 (80), Route 38 (55), Route 21 (40), Route 37 (30), Route 51 (20), and Route 40 (10). In addition, 200 transfers were made in Cleary Square to Route 33 (105) and Route 24 (95), as well as 80 daily transfers to Route 30 at Cummins Highway. In addition, 45 transfers were also made with Route 50, at either Cleary Square or Forest Hills.



With the exception of below-average numbers of young and elderly passengers, transit dependency levels of Route 32 riders are about average for the SOUTHBus corridor. Seventy-six percent of the route's riders do not have a car available for their trip, and 38 percent are from households with annual incomes of \$15,000 per year or less. Work trips account for 51 percent of all trips, and shopping trips account for 21 percent. Sixty-two percent of the riders use the MBTA five or more times per week.

## SERVICE COVERAGE

### Overall Assessment

The primary focus of Route 32 is to provide feeder service to downtown Boston. While Route 32 provides local service along Hyde Park Avenue, the market for local work trips along the route is quite small. Analysis of the 1980 US Census shows that only 80 work trips per day begin and end within one-quarter mile of the route, and that 17 (26%) of these trips utilize transit. Most of the work trips made by residents of the Route 32 service area are to destinations outside the immediate service area, but accessible via connections with rail rapid transit or other bus routes.

Route 32 provides service to the Forest Hills Orange Line station as well as other bus routes where passengers can transfer to reach their final destinations. The most significant work trip destination of residents of the Route 32 service area is Downtown Boston, where 752 of the service area residents work. Four hundred and seventy nine of these commuters use transit to get to work, resulting in a transit mode share of 64 percent.

The second most popular work destination for residents of the Route 32 service area is Fenway/Parker Hill, where 238 of the residents commute each day. The transit mode split for these trips is lower with only 66, or 28%, of these trips made using transit. Increases in the transit modal share for this destination may be attainable by reducing the number of transfers required to reach that area. Currently, Route 32 service-area residents must transfer once (to Longwood, Back Bay, and Park Square) or twice (to all other Fenway/Parker Hill destinations) to reach their final destinations. The amount of transferring required could be reduced by through-routing some Route 32 service with Route 39 or by extending some Route 32 service north of Forest Hills.

### Improved Service to the Longwood Medical Area, the Back Bay and Park Square

Service to the Longwood Medical Area, the Back Bay and Park Square for residents of the Route 32 service area could be improved by through-routing Route 32 with Route 39 or by extending Route 32 to Brigham Circle. Either change would provide increased service to three markets:

- The Fenway and Parker Hill areas
- The Arborway Branch of the Green Line which would improve connections to the Back Bay and Park Square
- The overlapping portion of Route 39

The through-routing of Route 32 and Route 39, however, would result in a long route with cycle times exceeding 90 minutes on a congested roadway which already has a high level of transit service. On outbound trips, congestion on Centre Street and Huntington Avenue may also result in reliability problems further along the route. Additionally, much of the area at the northern end of Route 39 is already well served by other routes and accessible to residents of the Route 32 service area. Finally, analysis of current loading of buses along Route 39 shows that existing service levels are adequate to meet demand. Therefore, the main benefit of through-routing Route 32 with Route 39 through to Copley Station would be the elimination of a transfer for Route 32 riders destined for the Fenway/Parker Hill area. However, this same benefit would be more efficiently obtained for most riders by extending service on Route 32 only as far as Brigham Circle.

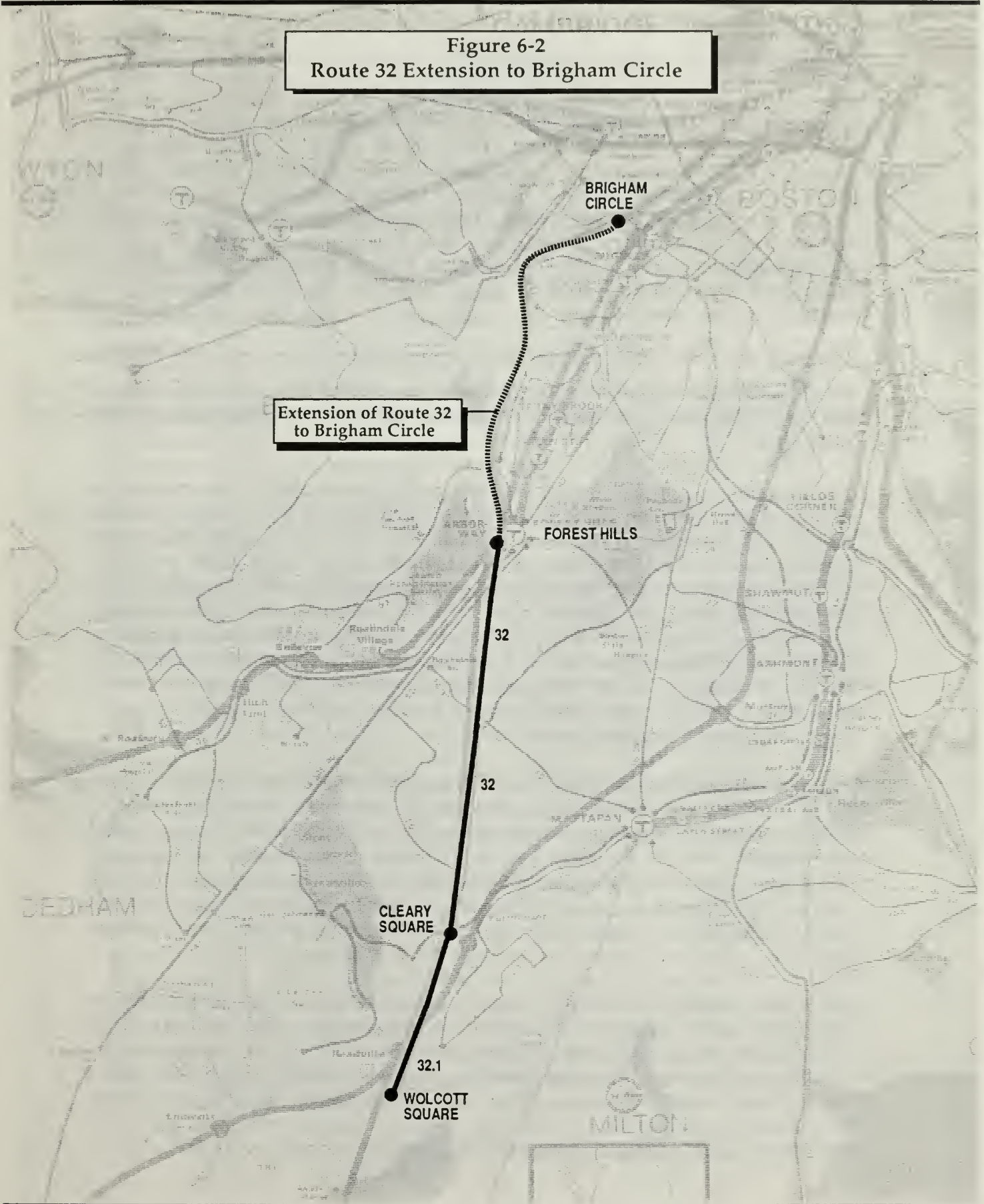
An extension of Route 32 only to Brigham Circle (see Figure 6-2) would provide direct service between Hyde Park, Roslindale, Jamaica Plain, Parker Hill, the Longwood Medical Area, and the Fenway. It would also provide direct connections to the Green Line. This extension would eliminate some transfers for existing riders of Route 32, and could increase ridership from the base of residents who travel to this area but currently do not use transit because it is not convenient. Based on results of the 1986 passenger survey (updated to current ridership levels), up to 1,095 daily transfers could be eliminated and 230 new passengers could be attracted by extending all Route 32 trips to Brigham Circle (see Figure 6-4). However, an extension of all Route 32 trips (variations 32.0 and 32.1) would increase operating costs by \$497,300 annually. Further, due to the loss of cash transfers, fare revenues would decrease by \$54,600.

Extension of Route 32.1 trips, which could operate throughout the day, would result in a 14.6 mile route with a 67 to 69 minute run time and a 72 to 79 minute cycle time. However, the resources required to extend this variation



**Figure 6-2**  
**Route 32 Extension to Brigham Circle**

**Extension of Route 32  
to Brigham Circle**





**Table 6-4**  
**Impacts of Route 32 Extension Alternatives**

	Max. Transfers <u>Eliminated</u>	New <u>Riders</u>	Decrease in Pax <u>Wait Time</u>	Increase in VSH	Impact on Fare <u>Revenue</u>	Increase in Oper <u>Costs</u>	Decr'd Pax Wait Time/ <u>Add'l VSH</u>
All Route 32	1,095	230	29.2	54	-\$54,600	\$497,300	0.5
Route 32.0	495	105	12.2	14	-\$33,300	\$105,900	0.9
1/2 Route 32.0	305	80	9.8	7	-\$14,200	\$50,600	1.4

on an all day basis (\$387,900), in combination with the long cycle time, would not justify the potential ridership increases (125) or travel time and transfer reductions.

An extension of Route 32.0 trips, which would operate during and around the fringes of peak periods, along the alignment of Route 39 up to Brigham Circle would add 2.6 miles to the route in each direction and 28 to 31 minutes of round trip running time. This would result in an 11.6 mile route with a 58 minute AM peak round trip running time and a 60 minute PM peak round trip running time. Addition of five to ten minutes of recovery time would result in a minimum cycle time of 63 minutes, and a maximum cycle time of 70 minutes. This extension could benefit up to 495 of the daily transfers with Route 39 (based on 1986 ridership counts) at \$109,400 (22% of the cost of extending all trips). Additionally, it would reduce passenger wait time by 12.2 hours and attract 105 new passengers.

Because frequent service is provided between Forest Hills and Brigham Circle by Route 39, the extension could operate "limited" from Arborway to Brigham Circle.<sup>26</sup> Passengers destined for the Longwood Medical Area would no longer have to transfer, and their travel times would be reduced. Passengers destined to other areas of the Fenway/Parker Hill and to the Back Bay or Park Square areas would have one or two transfers eliminated and travel times reduced. Direct connections would also be provided to the Green Line.

With the elimination of one or more transfers, transit would become more attractive and the transit mode split for trips destined to this area could reasonably be expected to increase to a level similar to that of other routes serving similar areas. Between Jamaica Plain and Fenway/Parker Hill, direct service on Route 39 attains a 47 percent transit share. Application of this

<sup>26</sup>No inbound boardings or outbound alightings.

service on Route 39 attains a 47 percent transit share. Application of this mode split to the Route 32 extension (and adjusting for differences in headways) would result in an increase of 72 passengers during the AM peak and 64 passengers during the PM peak. Additionally, travel times for trips to and from the Longwood Medical Area and Fenway/Parker Hill would be reduced by approximately 2.5 minutes.

An extended Route 32.0 would require seven buses in the AM peak and five buses in the PM peak in order to maintain the current AM and PM peak headways. This would be an increase of two buses in the AM peak and two buses in the PM peak. The cost would be \$105,900 per year and \$33,300 in revenues would be lost. Alternatively, if only every other 32.0 bus were extended, only six AM peak and five PM peak vehicles would be required (assuming that existing headways would be maintained). The extension of half of all Route 32.0 trips would eliminate up to 305 transfers, and also capture 80 percent (80) of the new riders expected from extension of all trips. The operating cost increase would also be reduced by approximately 50 percent, to \$50,600 per year, and fare revenues would decrease by \$14,200.

### RELIABILITY

Overall, service on Route 32 is provided with 90% on-time departure performance. Six percent of all trips were observed to depart three or more minutes late and four percent of all trips departed early. The percentage of late departures inbound and outbound are equal, but a larger percentage of the inbound trips are greater than five minutes late. Some of the late departures are attributable to the fact that book times are lower than actual run times and consequently, buses arrive late and depart late.

Most of the early departures occurred in the early morning and AM peak periods. During these periods, average outbound run times are lower than book times. Buses arrive early and sometimes also depart early. On-time departure performance is also slightly worse on variation 32.0, where only 86% of the trips depart on time as compared with 91% on variation 32.1.

Most reliability problems on Routes 32.0 and 32.1 result from the discrepancies between MBTA book times and actual run times. On Route 32.0, only 68% of the trips are within two minutes of scheduled run time, and only 59% of Route 32.1 trips are within two minutes of scheduled run time. Most shortfalls in scheduled run times occur during the early AM inbound on route variation 32.0 and during the early AM and AM peak inbound on variation 32.1. However, scheduled run times in the reverse direction are often greater than required, and round-trip run times exceed book times only during the early AM and evening periods on version 32.0, and during the early AM, AM peak and school periods on variation 32.1. In most cases,

adequate layover/recovery time is scheduled to compensate for the longer run times and prevent successive trips from departing late. Tables 6-5 and 6-6 summarize the performance of Routes 32 and 32.1 in terms of schedule statistics, and provide insight to the service changes needed to improve reliability and efficiency.

**Table 6-5**  
**Route 32.0 Schedule Statistics: Scheduled Versus Observed**  
**(All Figures in Minutes)**

	3:00am- 6:59am	7:00am- 8:59am	2:00pm- 4:29pm	4:30pm- 5:59pm	6:00pm- 8:29pm
<i><u>Inbound</u></i>					
Scheduled Run Time	11	15	14	14	12
Observed Run Time	15	16	11	12	11
STD of Obs Run Times	3.7	2.2	1.7	2.1	1.7
<i><u>Outbound</u></i>					
Scheduled Run Time	11	15	16	17	14
Observed Run Time	10	13	18	16	16
STD of Obs Run Times	2.5	1.4	2.4	1.7	4
<i><u>Round Trip</u></i>					
Scheduled Cycle Time	42	42	42	42	42
Scheduled RT Run Time	22	30	30	31	26
Obs RT Run Time	25	29	29	29	27
Schd Recovery/Layover Time	20	12	12	11	16
Obs Recovery/Layover Time	17	13	14	14	15
STD * 1.5	9	5	6	6	9
Optimum Cycle Time	34	34	35	35	36

In nearly all cases, cycle times are adequate or more than adequate on both Routes 32.0 and 32.1. The only exception is on Route 32.1 during the school period, where cycle times need to be increased from 42 to 52 minutes. The existing vehicle deployment could be maintained by increasing headways from 15 to 18 minutes, or, to reduce crowding (see next section), by adding one vehicle to reduce headways to 13 minutes.

During other periods, reliability could be improved by adjusting book times within existing cycle times and, in some cases, cycle times could also be reduced. Cycle times on Route 32.0 could be reduced to 36 minutes throughout the day. This would reduce vehicle requirements during the AM peak by one and allow PM peak headways to be reduced from 14 to 12 minutes. In addition, four minutes of schedule time should be added to inbound trips during the early AM period (within the 36 minute cycle time).



**Table 6-6**  
**Route 32.1 Schedule Statistics: Scheduled Versus Observed**  
**(All Figures in Minutes)**

	<u>3:00am- 6:59am</u>	<u>7:00am- 8:59am</u>	<u>9:00am- 1:59pm</u>	<u>2:00pm- 4:29pm</u>	<u>4:30pm- 5:59pm</u>	<u>6:00pm- 8:29pm</u>	<u>8:30pm- 2:59am</u>
<i><u>Inbound</u></i>							
Scheduled Run Time	14	19	18	18	18	19	14
Observed Run Time	19	22	18	19	17	15	13
STD of Obs Run Times	3.5	3.4	1.9	2.2	2.9	1.9	2.0
<i><u>Outbound</u></i>							
Scheduled Run Time	14	20	19	21	22	18	14
Observed Run Time	13	17	18	23	21	16	15
STD of Obs Run Times	3.7	2.6	3.5	2.9	2.9	2.2	2.7
<i><u>Round Trip</u></i>							
Scheduled Cycle Time	42	48	45	45	56	60	60
Scheduled RT Run Time	28	39	37	39	40	37	28
Obs RT Run Time	32	40	37	42	37	32	28
Schd Rec/Layover Time	14	9	8	6	16	23	32
Obs Rec/Layover Time	11	8	9	3	19	29	32
STD * 1.5	11	9	8	8	9	6	7
Optimum Cycle Time	43	49	45	50	46	38	35

Existing cycle times on Route 32.1 remain appropriate during the AM peak and base periods. However, three minutes of scheduled time should be added to inbound trips and three minutes subtracted from outbound trips during the AM peak. With the exception of the extra Route 32.0 trips, Route 32.1 would continue to be coordinated with Route 32.0 during the AM peak at six minute intervals. Cycle times could be reduced during the PM peak and evening periods. For most of the PM peak, the cycle time could be reduced from 56 to 48 minutes, which would allow headways to be reduced to 12 minutes and coordinated with Route 32.0 at 12 minute headways. After 6:00 pm, cycle times could be reduced to 40 minutes and service could be operated at 20 minute headways. These changes are summarized in Table 6-7.

With these changes, reliability should improve and one less vehicle would be required to operate the same level of service in the AM peak. Vehicle requirements during other periods would remain unchanged. Implementation of the recommended changes in cycle times and headways would result in cost savings of approximately \$30,000 per year. Additionally, 285 new riders would be attracted by the headway reductions possible within the revised cycle times.

Table 6-7  
Route 32: Revised Schedule Statistics

	3:00am- 6:59am	7:00am- 8:59am	9:00am- 1:59pm	2:00pm- 4:29pm	4:30pm- 5:59pm	6:00pm - 8:29pm	8:30pm- 2:59am
<u>Route 32.0</u>							
Existing Cycle Time	42	42	--	42	42	42	--
Revised Cycle Time	36	36	--	36	36	38	--
Existing Headway	--	9	1T	--	14	2T	--
Revised Headway	--	9	1T	--	12	2T	--
Existing # of Vehicles	--	5	1	--	3	1	--
Revised # of Vehicles	--	4	1	--	3	1	--
<u>Route 32.1</u>							
Existing Cycle Time	42	48	45	45	56	60	60
Revised Cycle Time:	44	48	45	54	48	40	40
Existing Headway	20	12	15	15	16	28	28
Revised Headway	22	12	15	18	12	20	20
Existing # of Vehicles	2	4	3	3	4	2	2
Revised # of Vehicles	2	4	3	3	4	2	2

Alternatively, the headway on Route 32.0 during the AM peak could be reduced to seven minutes with the same number of buses. This headway reduction would not significantly affect ridership. However, the AM peak headway combination would hinder schedule coordination between the routes, and service could be better provided by running 12 minute headways on both variations. If both variations were run at 12 minute headways, effective wait times for all riders boarding on the segment north of Cleary Square would be reduced (because the new average wait time for passengers would be reduced to three minutes), but few new riders would be attracted. Additionally, cost savings of \$18,300 would result from the reduction in headways on Variation 32.0.

It should be noted that the cycle times suggested in Table 6-7 include the minimum recovery and layover required to ensure 90% on-time performance. While these times are generally lower than those currently scheduled, the revisions to scheduled running time to more accurately reflect actual running time on the route should reduce the need for long recovery times. Additionally, the revised recovery time incorporates a measure of the variability of the actual running times and therefore should minimize the deviations between scheduled and observed times.

## LEVEL OF SERVICE

Headways for the shared segment of Routes 32 and 32.1 range from two to six minutes in the peak periods and up to 45 minutes in the evening. Base service is provided at 12 to 15 minute headways and is supplemented during the school period with six to seven minute headways. Early morning service is provided at irregular headways ranging from six minutes to 23 minutes. Service on the portion of Route 32.1 south of the combined segment includes 12 minute headways throughout most of the day, with less service during the early mornings and evenings where headways range up to 30 minutes.

Crowding is not a pervasive problem at these service levels, although some school and peak-period runs have load factors over 1.40. The Fall 1987 increase in AM peak service should be adequate to accommodate the 33 percent ridership increase while holding peak loads to acceptable levels. In the Spring of 1986, AM peak inbound peak loads averaged 39 passengers. The service and ridership increases through the Fall of 1987 should have increased average peak loads to approximately 44. During the base and PM peak periods, peak loads were low enough so that service could be reduced in spite of the ridership increase. During the school period, however, the elimination of one outbound trip combined with a 17 percent ridership increase during that period should have resulted in an increase in peak loads to 62, or 155 percent of the seated capacity of an RTS II bus.

However, because crowding is inconsistent across time periods and between runs (one run may have a load factor of 1.53 and the next run a load factor of 0.33), it would be difficult to alter schedules to prevent crowding yet continue to provide service efficiently. The variations in loads apparently reflect problems in schedule adherence, not capacity limitations (see previous section). The recommended revisions to book and cycle times as well as the headway reductions should help to reduce crowding levels. Additionally, five new trips have been added to reduce crowding during the AM peak, but runs were cut from the school and PM peak periods which already experienced some crowding. The reduction in AM peak headways on Route 32.0 should relieve crowding during that period, but the reduction in school and PM period headways may begin to cause crowding problems. Headways could be reduced to 13 minutes (from 15) during the school period by adding one vehicle. This change would relieve the current crowding at a cost of \$16,400. The reductions in PM peak headways discussed above should relieve crowding during that period as well. Both school and PM peak period service should be monitored to determine if service levels remain adequate.





---

## 7. Route 34

---

*Route 34: Walpole/Dedham Line - Forest Hills*

### ROUTE PROFILE

Route 34 provides service between Walpole and Forest Hills, and is the longest and most heavily utilized of the SOUTHBus routes. Since ridechecks were performed in the Spring of 1986, most service has been extended from East Walpole to Walpole Center (see Figure 7-1). The extension was designed to provide connections with commuter rail at Walpole Center and to replace discontinued private bus service. Nine variations now operate between Walpole Center and Forest Hills, or portions thereof, and provide express and/or local service. These variations, shown in Figure 7-2, are as follows:

- 34.0 **Dedham Line-Forest Hills** via Washington St.
- 34.2 **Walpole Ctr-Forest Hills** local via Xaverian High School (extended to Walpole Center commuter rail station in Fall 1987).
- 34.3 **Walpole Ctr-Forest Hills** limited; pm outbound trips via Dedham Mall (extended to Walpole Center commuter rail station in Fall 1987).
- 34.4 **Walpole Ctr-Forest Hills** local (service initiated in Fall 1987).
- 34.5 **Walpole Ctr-Forest Hills** limited outbound (extended to Walpole Center commuter rail station in Fall 1987).
- 34.6 **East Walpole-Forest Hills** local (most 34.6 trips extended to Walpole Center commuter rail station in Fall 1987 as Route 34.5).
- 34.7 **Walpole Ctr-Forest Hills** via Dedham Mall (extended to Walpole Center commuter rail station in Fall 1987).
- 34.8 **East Walpole-Forest Hills** via Dedham Mall.
- 34.9 **East Walpole-Dedham Line** (Note: All trips are through-routed at Dedham Line with a Route 34.0 trip).

Most Route 34 service (149 of 237 daily trips) is on variation 34.0, which operates only between the West Roxbury/Dedham line and Forest Hills and makes all stops. As of the Winter of 1988, headways on this variation are approximately ten minutes in the AM peak, 15 to 30 minutes during the mid-day, 12 minutes in the school period, eight minutes in the PM peak, and 60 minutes throughout most of the evening. School and PM peak headways are one minute longer than when the route was ridechecked in the Spring of 1986 (see Table 7-1).

**Figure 7-1**  
**Route 34: Walpole Center - Forest Hills**

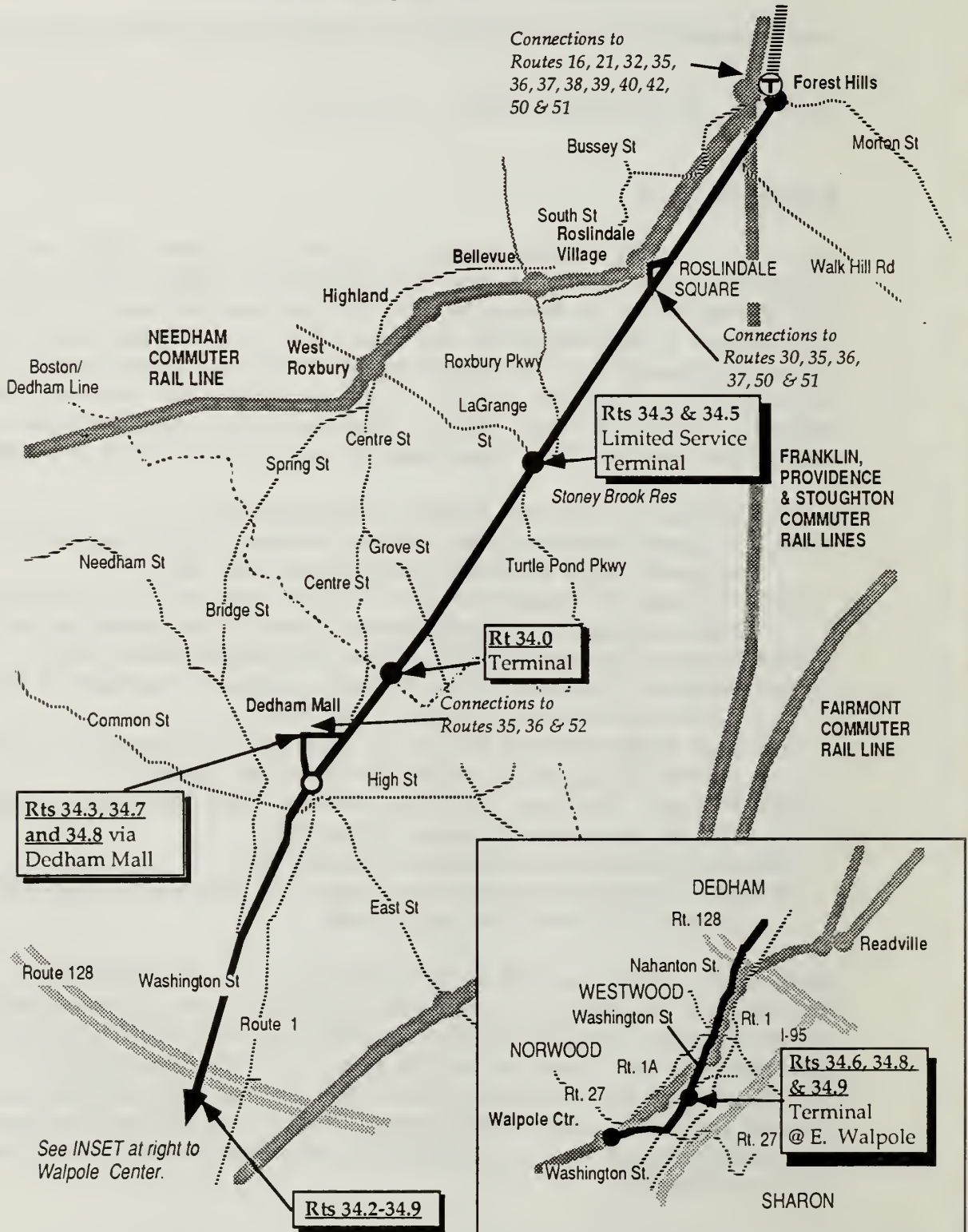




Table 7-1  
Route 34 Weekday Service Statistics

Hours of Operation (Spring 1986 and Fall 1987): 4:40 am - 1:31 am

	Average One-Way Length	One- Way Trips	Avg Headway (Min-Peak Dir)					All Day	
			AM	Base	Sch	PM	Eve	VSM	VSH
Spring 1986									
Rt 34.0	4.2	153	9	22	12	7	49	642.6	66.4
Rt 34.2	16.1	2	npd <sup>27</sup>	--	--	--	--	32.2	1.8
Rt 34.3	15.4	16	16	--	30	1T	1T	246.4	17.1
Rt 34.5	15.4	6	--	--	--	16	--	92.4	5.0
Rt 34.6	15.4	16	17	1T	--	--	63	246.4	13.2
Rt 34.7	11.8	3	--	--	--	--	60	35.4	2.8
Rt 34.8	16.0	41	--	30	26	21	60	656.0	41.0
Rt 34.9	11.2	4	--	--	--	--	50	44.8	1.9
Total/Avg		241	6	14	9	5	26	1996.2	149.1
Winter 1988									
Rt 34.0	4.2	149	9	22	14	8	48	625.8	65.3
Rt 34.2	18.1	2	npd	--	--	--	--	36.2	2.4
Rt 34.3	17.4	13	19	--	30	1T	1T	226.4	8.0
Rt 34.4	17.4	12	npd	npd	--	--	--	208.8	12.0
Rt 34.5	17.4	8	1T	--	--	15	--	139.2	8.7
Rt 34.6	17.4	3	--	--	--	--	63	52.2	2.8
Rt 34.7	13.8	41	1T	22	30	22	19	565.8	42.3
Rt 34.8	16.0	6	--	--	--	--	60	96.0	5.0
Rt 34.9	13.2	3	--	--	--	--	npd	39.6	1.3
Total/Avg		237	6	14	10	5	29	1,990.0	147.8
Change		-2%	0%	0% +11%	0%	+12%		-1%	-1%

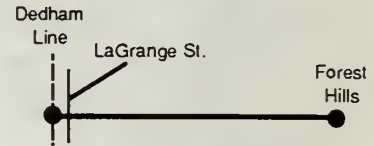
Route 34.0 service is supplemented throughout the day by a number of variations that operate to and from Walpole Center or East Walpole. Two of these variations, 34.6 and 34.8, provide service between East Walpole and Forest Hills. Both East Walpole variations only operate during the evening only as short-turned variations of the Walpole Center service, and variation 34.8 operates via the Dedham Mall. Variation 34.9 operates between East

<sup>27</sup>npd = no peak direction service - all service is operated in the non-peak direction.

**Figure 7-2**  
**Route 34 Variations**

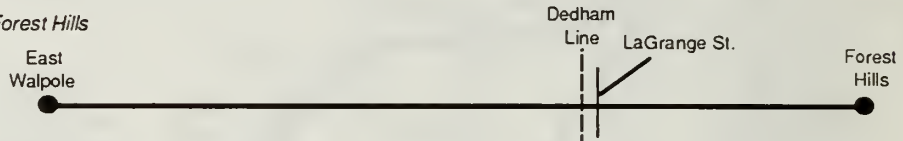
**Dedham Line - Forest Hills Service**

*34.0 Dedham Line - Forest Hills*



**East Walpole - Forest Hills Service**

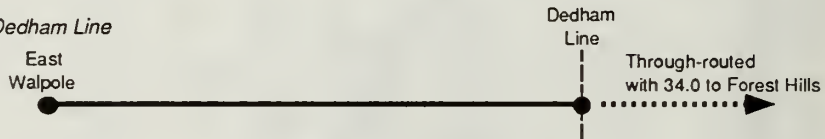
*34.6 East Walpole - Forest Hills*



*34.8 East Walpole - Dedham Line via Dedham Mall*

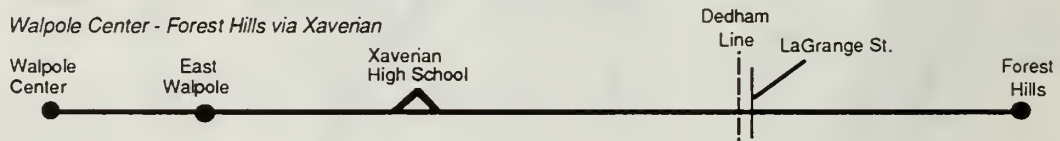


*34.9 East Walpole - Dedham Line*

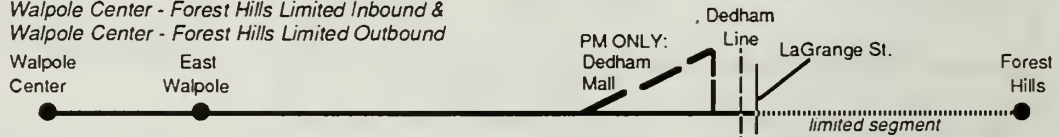


**Walpole Center - Forest Hills Service**

*34.2 Walpole Center - Forest Hills via Xaverian*



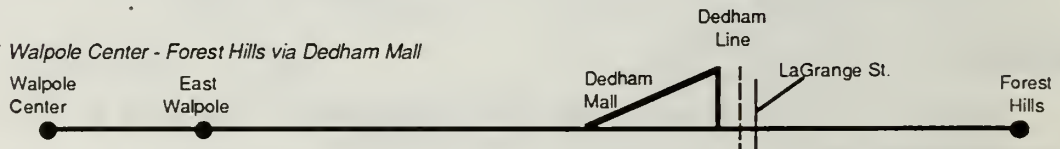
*34.3 Walpole Center - Forest Hills Limited Inbound &  
34.5 Walpole Center - Forest Hills Limited Outbound*



*34.4 Walpole Center - Forest Hills*



*34.7 Walpole Center - Forest Hills via Dedham Mall*



Walpole and the Dedham Line only, but is through-routed with 34.0 at the Dedham Line to Forest Hills. The remaining variations provide service between Walpole Center and Forest Hills. Variation 34.2 operates via Xaverian High School, variations 34.3 and 34.5 operate limited inbound and outbound, respectively, between LaGrange Street and Forest Hills, and variation 34.7 operates via the Dedham Mall (see also Figure 7-3).

During the early morning (4:40 am - 5:59 am), variations 34.4 and 34.5 supplement Route 34.0 to provide service to and from Walpole. One Route 34.5 trip operates inbound from Walpole Center to Forest Hills, and makes all local stops. Four Route 34.4 trips operate outbound from Forest Hills in the Early AM. In total, there are currently eleven short-turned trips (Route 34.0 to and from the West Roxbury/Dedham line), and five full-route trips to and from Walpole Center in the early morning. Schedules of short-turned trips and Walpole Center trips are not coordinated, and headways range from ten to 20 minutes.

During the AM peak (6:00 am - 8:45 am), variation 34.3 operates inbound from Walpole Center, and stops only to discharge passengers north of LaGrange Street. In the Winter of 1988, all service except three trips back to Walpole in the outbound direction is on variation 34.4 ( which makes all stops and operates to and from Walpole Center). The other three trips are on variations 34.2 (2) and 34.7 (1), which also operate to Walpole Center via Xaverian High School and the Dedham Mall, respectively. One inbound Route 34.7 trip is provided during this time period as well. In total, there are 37 Route 34.0 trips to and from the West Roxbury/Dedham line, and 19 trips to and from Walpole during the AM peak. Route 34.0 trips are not coordinated with Walpole Center trips in either direction, and actual intervals between buses range from one to 15 minutes.

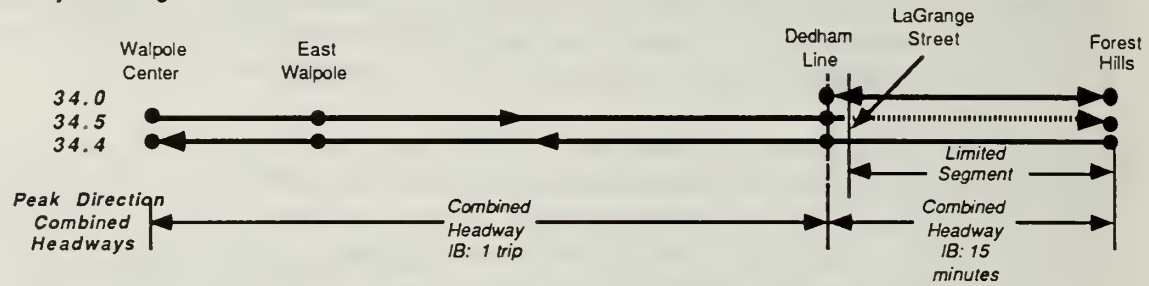
During the base period, Walpole service is operated in both directions with variation 34.7, which makes all stops and operates via the Dedham Mall. Base period schedules are coordinated so that Route 34.0 trips alternate with Walpole trips at 15 minute intervals.

During the school period, inbound trips from Walpole Center continue to be operated with Route 34.7, which makes all stops and travels via the Dedham Mall. Outbound trips switch to limited service at the beginning of the period as variation 34.3, which will not discharge passengers prior to LaGrange Street. The afternoon outbound Route 34.3 trips serve the Dedham Mall. School period schedules of Route 34.0 trips and Walpole trips are not coordinated so that actual intervals between buses range from five to 15 minutes.



**Figure 7-3**  
**Route 34 Service by Time Period**

*Early Morning*



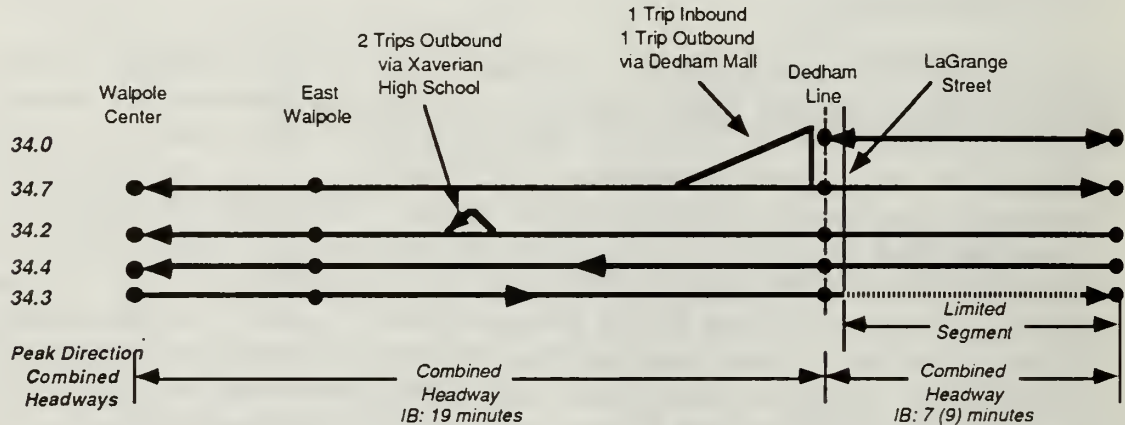
Inbound Headways:

34.0 Dedham Line - Forest Hills IB: 17 minutes  
34.5 Walpole Center - Forest Hills Limited Outbound  
IB: 1 Trip

Outbound Headways:

34.0 Dedham Line - Forest Hills OB: 13 minutes  
34.4 Walpole Center - Forest Hills OB: 22 minutes

*AM Peak*



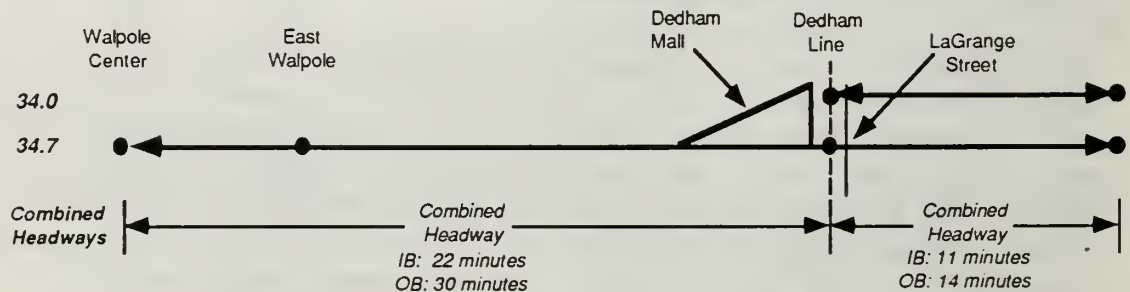
Inbound Headways:

34.0 Dedham Line - Forest Hills IB: 9 minutes  
34.7 Walpole Center - Forest Hills via Dedham Mall  
IB: 1 Trip  
34.3 Walpole Center - Forest Hills Limited Inbound  
IB: 19 minutes

Outbound Headways:

34.0 Dedham Line - Forest Hills OB: 9 minutes  
34.2 Walpole Center - Forest Hills via Xaverian High  
School OB: 2 Trips  
34.4 Walpole Center - Forest Hills OB: 18 minutes  
34.7 Walpole Center - Forest Hills via Dedham Mall  
OB: 1 Trip

*Base*



Inbound Headways:

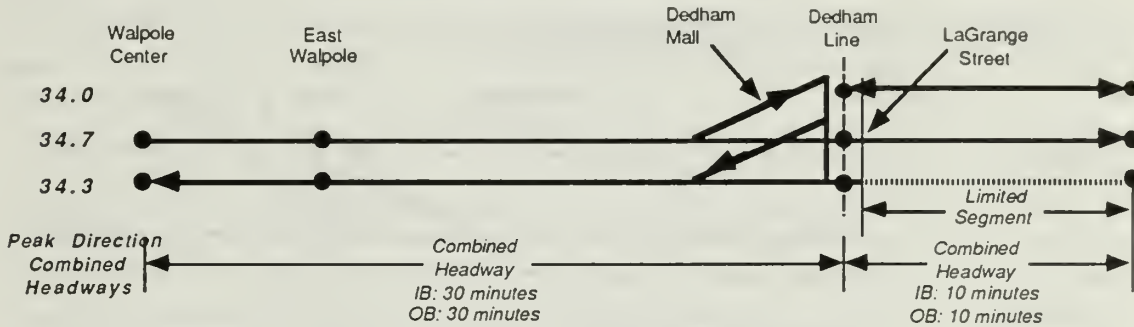
34.0 Dedham Line - Forest Hills IB: 22 minutes  
34.7 Walpole Center - Forest Hills via Dedham Mall  
IB: 22 minutes

Outbound Headways:

34.0 Dedham Line - Forest Hills OB: 30 minutes  
34.7 Walpole Center - Forest Hills via Dedham Mall  
OB: 30 minutes

Figure 7-3 (Cont.)  
Route 34 Service by Time Period

*School*



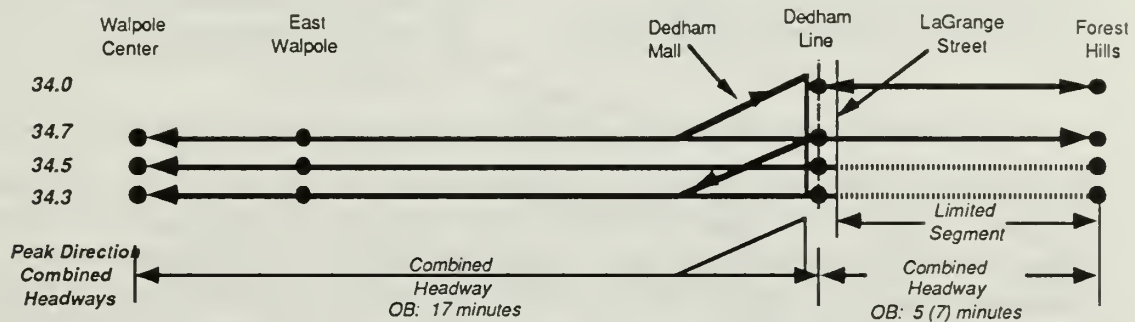
Inbound Headways:

34.0 Dedham Line - Forest Hills IB: 16 minutes  
34.7 Walpole Center - Forest Hills via Dedham Mall  
IB: 30 minutes

Outbound Headways:

34.0 Dedham Line - Forest Hills OB: 14 minutes  
34.3 Walpole Center - Forest Hills Limited Inbound via  
Dedham Mall OB: 30 minutes

*PM Peak*



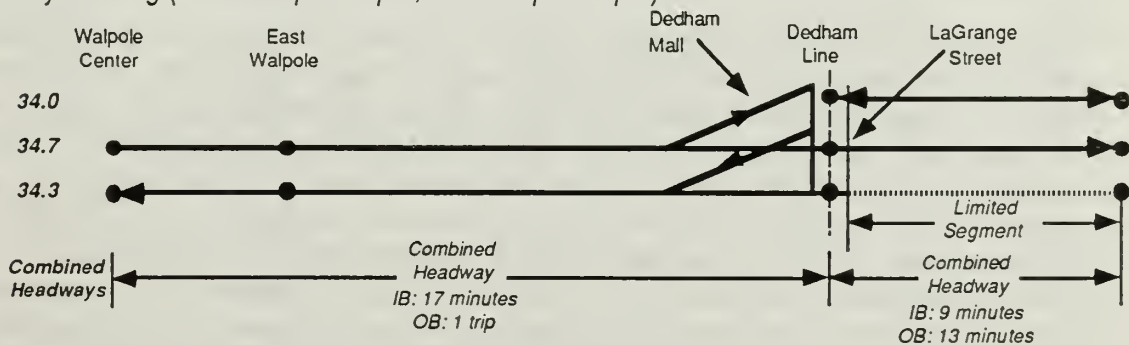
Inbound Headways:

34.0 Dedham Line - Forest Hills IB: 8 minutes  
34.7 Walpole Center - Forest Hills via Dedham Mall  
IB: 22 minutes

Outbound Headways:

34.0 Dedham Line - Forest Hills OB: 8 minutes  
34.3 Walpole Center - Forest Hills Limited Inbound via  
Mall OB: 1 trip  
34.5 Walpole Center - Forest Hills Limited Outbound  
OB: 15 minutes

*Early Evening (last OB trip 6:35 pm; last IB trip 7:40 pm)*



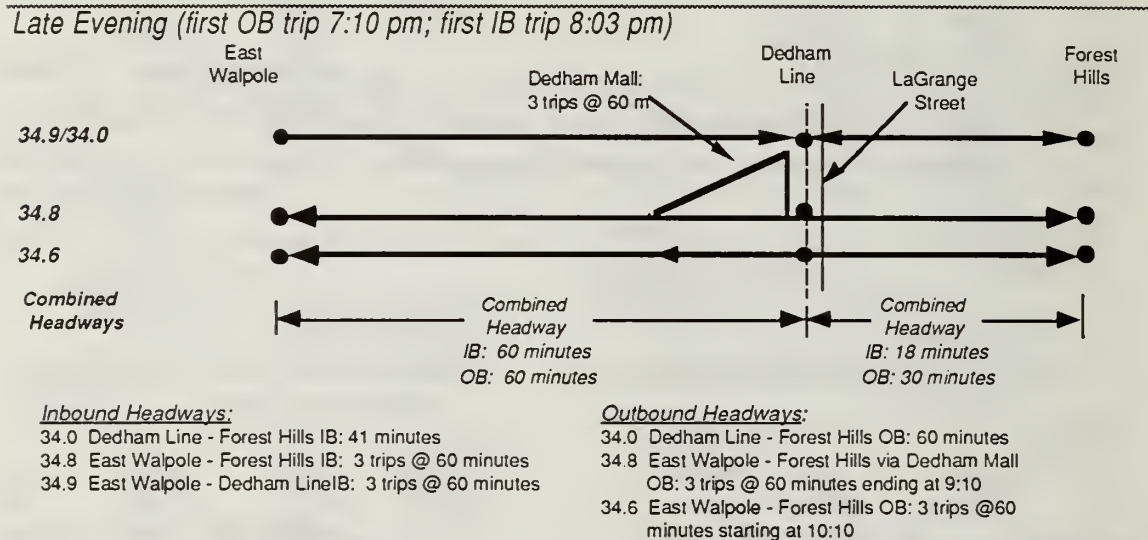
Inbound Headways:

34.0 Dedham Line - Forest Hills IB: 18 minutes  
34.7 Walpole Center - Forest Hills via Dedham Mall  
IB: 18 minutes

Outbound Headways:

34.0 Dedham Line - Forest Hills OB: 20 minutes  
34.3 Walpole Center - Forest Hills Limited Inbound via  
Dedham Mall OB: 1 trip

Figure 7-3 (Cont.)  
Route 34 Service by Time Period



The PM peak (4:00 pm - 6:14 pm) operations are the reverse of the AM peak. Outbound trips to Walpole Center are operated with variation 34.5, which makes limited stops outbound until LaGrange Street (stopping only to pick up passengers) and then makes all local stops through to Walpole Center. Except for one outbound 34.3 trip, there is no outbound PM peak service to the Dedham Mall. Inbound trips (variation 34.7) operate via the Dedham Mall and make all stops. PM peak schedules of short-turned trips and Walpole trips are not coordinated, but actual intervals between buses are no longer than eight minutes.

Early evening service is provided between Forest Hills and Walpole Center until 6:35 pm outbound and 7:40 pm inbound. After these trips, all Walpole trips are short-turned at East Walpole. Early evening inbound trips are provided with variation 34.7 via the Dedham Mall and variation 34.0. Late evening inbound trips (after 6:35 pm outbound and 7:40 pm inbound) are operated with variation 34.8, which runs via the Dedham Mall until 10:03. After this time service is provided with a combination of variations 34.9 and 34.0. Route 34.9 operates only between East Walpole and the West Roxbury/Dedham Line, and is through-routed with Route 34.0 to continue service from the Dedham Line to Forest Hills. These trips, in effect, are the same as Route 34.6 trips and do not serve the Dedham Mall. In the outbound direction, early evening trips are provided with variations 34.0 and 34.3. During the early evening, one variation 34.3 trip operates outbound via the Dedham Mall and makes all stops. During the late evening, variation 34.8



operates via the mall until 9:10 pm, after which it is replaced by Route 34.6 service which does not serve the mall. Schedules of Route 34.0 and Walpole trips are coordinated to provide service between the Dedham Line and Forest Hills at 30 minute intervals or less.

Overall service levels are nearly the same as in 1986, except that PM peak headways on Route 34.0 have been increased slightly to seven to eight minutes, reducing the total number of trips on variation 34.0 from 153 per weekday to 149. The number of vehicle trips to and from Walpole has stayed the same at 88 per weekday. When ridechecks were conducted in the Spring of 1986, total ridership on all variations was 6,735 passenger trips per day. Of this ridership, 3,290 trips were made on Route 34.0, and 3,445 were made on the Walpole variations. Since the ridechecks were conducted, two changes have occurred: the extension of most Walpole trips from East Walpole to Walpole Center in the Fall of 1987, and the opening of the new Orange Line in May 1986. Pointchecks conducted August through October 1987 indicate that ridership to and from Forest Hills is up approximately 21 percent, or 1,025 trips per day (see Table 7-2).

**Table 7-2**  
**Route 34 Weekday Ridership and Productivity Statistics**

		Boardings/VSM							Boardings/
	Weekday	Early	AM			PM		All	VSH
	Boardings	AM	Peak	Base	Sch	Peak	Eve	Day	All Day
Spring 1986									
34.0	3,290	3.0	6.4	5.2	6.6	5.2	3.2	5.1	49.6
34.2	55	--	1.7	--	--	--	--	1.7	31.7
34.3	800	--	2.5	--	5.2	3.6	2.9	3.2	46.8
34.5	305	--	--	--	--	3.3	--	3.3	61.0
3346	425	1.1	2.2	1.0	--	--	1.3	1.7	32.1
34.7	45	--	--	--	--	--	1.2	1.2	16.0
34.8	1,760	--	--	2.7	4.5	2.4	2.0	2.7	42.9
34.9	55	2.9	--	--	--	--	0.6	1.2	27.4
Total/Avg	6,735	2.1	3.5	3.2	5.5	3.8	2.1	3.4	45.2
Fall 1987									
Total/Avg	7,760							3.9	52.5
Change	+15%							+155	+16%

Percent of passengers 65 or older: 14.2%

Percent without a car available for trip: 71.4%

Spring 1986 peak load points: Inbound: Washington St. @ Aldwin Road  
Outbound: Washington St. opp. Toll Gate Way

Only very limited pointchecks have been conducted along intermediate points of the route. As a result, it is not possible to determine the cause of this increase from the pointcheck data, although it is likely that much of the increased ridership has been attracted by the new Orange Line and the Walpole Center extension. Assuming no other growth along the line, Fall 1987 ridership would then be approximately 7,760, or 15 percent higher than in the Spring of 1986.

Most Route 34 travel is oriented inbound towards Forest Hills in the morning and outbound towards Dedham and Walpole in the afternoon, with a large number of riders traveling to and from the Orange Line and downtown Boston. As shown in Table 7-3, the highest proportion of riders live in Roslindale, West Roxbury, and Norwood and travel to downtown Boston, Dedham and Norwood. In total, 63 percent of all Route 34 riders travel to and from Forest Hills, with 39 percent transferring to the Orange Line and 17 percent transferring to other bus routes at Forest Hills. Most bus transfers made at Forest Hills are with Route 39 (960 per day, comprising 14 percent of Route 34's ridership) followed by Route 32 (165), Route 21 (70), Route 51 (75) and Route 42 (35). Transfers are also made with Route 35 (65 at either Roslindale Square or the Dedham Mall) and Route 30 (120), Route 36 (95), Route 38 (15), Route 40 (15), and Route 37 (10) at or near Roslindale Square.

---

**Table 7-3**  
**Home, Work and School Locations of Route 34 Riders**

	<u>Percent of Home- Based Trips</u>	<u>Percent of Work or School Trips</u>
Roslindale	31.4%	7.0%
West Roxbury	18.0%	4.6%
Norwood	17.0%	9.7%
Dedham	5.1%	11.4%
Walpole	5.1%	0.3%
Downtown Boston	4.0%	47.3%
Other	<u>15.0%</u>	<u>19.7%</u>
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>

---

As indicated by the percentage of work and school trips to Dedham and Norwood, there are also a significant number of trips in the reverse commute direction. While reverse commute trips account for only 28 to 29 percent of all peak period trips, they totaled 865 trips in 1986. Fall 1987 pointchecks indicate that the number of these trips to and from Forest Hills have also increased since the opening of the new Orange Line.

Route 34 riders are about average in terms of transit dependency in the SOUTHBus corridor. Twelve percent of the route's riders are 17 or younger, 14 percent are 65 or older, 71 percent do not have a car available for their trip, and 38 percent are from households with incomes of \$15,000 per year or less. All of these figures are within one percent of corridor averages. Fifty percent of all trips are for work purposes, and 66 percent use the MBTA five or more days per week.

## SERVICE COVERAGE

### Overall Assessment

Although Route 34 is a very long route, the local work trip market that it directly serves (trips which begin and end within one-quarter mile of the route) is relatively small, at only 200 daily trips. However, because of its length and extensive bus and rail connections at Forest Hills and Roslindale Square, it provides access to a much larger market. Most of Route 34's ridership is comprised of passengers who make connections to other parts of the MBTA system. When surveyed in the Spring of 1986, only 31 percent of the route's riders walked to and from the bus at both ends of their trip, while 39 percent transferred with the Orange Line and 25 percent transferred with other buses. Recent increases in ridership to and from Forest Hills have further increased the proportion of transfer trips.

Based on these characteristics, more riders would benefit from improved connections to Forest Hills than from increased local coverage. Further, increased local coverage would require increased penetration into local neighborhoods along Washington Street, which would inconvenience a large number of existing riders for relatively small gains in new ridership. Also, as the length of any particular diversion is increased to serve more local trips, the loss of existing riders would increase due to longer travel times.

As a result, the primary focus of Route 34 should continue to be service to and from Forest Hills to provide connections to the rest of the MBTA system. Improvements could potentially be made in the following areas:

- Better coordination of variations during certain time periods to provide more balanced loads.
- Improved connections to commuter rail at Walpole Center.
- Provision of park and ride facilities in the vicinity of Route 128 and Washington Street, possibly at the Dedham Mall.



- Express (non-stop) service on some peak period trips between a park and ride lot and Forest Hills.

At the same time, improvements in the following areas could also be made for local riders without significantly impacting Forest Hills riders:

- Additional service to the Dedham Mall.
- The operation of Walpole "limited" trips as local trips to provide more service between LaGrange Street and Forest Hills (since limited trips already stop at most stops anyway).

Lastly, there appear to be opportunities to reduce service levels on some variations due to low ridership, and to simplify the operation of the route by eliminating some redundant variations.

#### Increased Service North of LaGrange Street

Currently, crowding problems occur on some peak period Route 34.0 trips. This crowding could be alleviated by carrying local trips on what are now Walpole "limited" trips. Most limited trips already stop at many of the stops between LaGrange Street and Forest Hills already, so the additional time involved in serving local riders would be small, and the cost of providing additional Route 34.0 service could be avoided. However, care must be taken in scheduling to ensure that the East Walpole trips would not become crowded by carrying too many local passengers. This can be achieved if long trips follow short trips at relatively small headways in order to control the number of local riders boarding the long trips.

MBTA book times assume that local service running times are seven minutes longer than local trips for the shared portion of the routes. However, based on the observed number of stops per trip and boardings and alightings per stop for local and limited services, coupled with general assumptions concerning bus acceleration and deceleration and boarding and alighting times per passenger, the actual difference is probably closer to one and one-half minutes.<sup>28</sup>

With only a one and one-half minute increase in running times, local trips could be operated within the same cycle time as limited trips; therefore no additional costs would be involved. The travel time increase for Walpole riders would be minimal so that no loss of limited service ridership would be expected while some gains in local ridership would be expected (125 trips per day - see Table 7-4). However, even assuming that the actual difference is as

---

<sup>28</sup>Actual running time data for local and limited service during the same period is not available.

high as the book time difference and that cycle times would need to be increased, the additional cost to operate limited service as local service would be only \$8,000 per year, compared to \$7,100 per year for *each* additional Route 34.0 round trip. In this case, there would be some loss of limited service ridership (35 trips per day), but this loss of limited service ridership would be more than offset by the increase of 125 local trips per day.

**Table 7-4**  
**Impacts of Replacing Limited Service (34.3 and 34.5) with Non-limited Service (34.4)**

	<u>Early AM</u>	<u>AM Peak</u>	<u>PM Peak</u>	<u>Total</u>
Current Route Variation	34.5	34.3	34.5	
Recommended Variation	34.4	34.4	34.4	
Max. Annual Cost Impact	\$450	\$1,800	\$2,300	\$4,500
Min. Annual Cost Impact	\$0	\$0	0	\$0
Max. Ridership Loss				
Due to Increased Travel Time	5	20	10	35
Min. Ridership Loss				
Due to Increased Travel Time	0	0	0	0
Ridership Gain Due to Increased Service Area and Frequencies	5	55	65	125
<i>Net Ridership Gain</i>	<i>0 - 5</i>	<i>35 - 55</i>	<i>55 - 65</i>	<i>90 - 125</i>

### Reduction of Route Variations

The nine variations of Route 34 provide service along Washington Street between Forest Hills and Walpole Center, or portions thereof, in Walpole, Norwood, Westwood, Dedham and Boston. Variations 34.2 through 34.7 provide service between Walpole and Forest Hills along the entire length of the route, and operate via High Plain Street, East Street and Main Street to Walpole Center.<sup>29</sup> Variations 34.3 and 34.5 provide limited service between LaGrange Street and Forest Hills. Variation 34.3 stops only to discharge passengers inbound on this portion of the route, and variation 34.5 stops only to pick up passengers outbound on this portion of the route. However, because these trips stop at most stops to discharge (34.3) or pick up (34.5) passengers, little actual travel time savings are realized. Therefore, as discussed in the previous section, Route 34.3 and 34.5 trips should be scheduled as Route 34.4 trips. Additionally, 34.3 operates like 34.7 (via the Dedham Mall) outbound in the evenings, and could be scheduled as such

<sup>29</sup>Some 34.6 trips end in East Walpole and 34.7 ends at East Street.

without affecting cost or ridership. Finally, variations 34.3 and 34.5 operate locally outbound and inbound respectively, and could be scheduled as 34.4 trips in order to eliminate confusion.

Route 34.9 provides local service between East Walpole<sup>30</sup> and the Boston-Dedham line. All Route 34.9 trips are through-routed with Route 34.0 trips, which provide service between the Boston-Dedham line and Forest Hills. Thus, each 34.9/34.0 trip operates as a 34.6 trip, and could be scheduled as such. This change would have no impact on travel time, ridership or cost, but would simplify scheduling.

### Reduced Service to Walpole Center

Fall 1988 ridechecks of the Route 34 variations which operate to Walpole Center show few boardings and alightings on the extended segment of the route. Daily boardings on this segment of the route total 140 and alightings total 145. Boardings on the extended portion of the route average only 3.4 passengers per trip inbound and 3.7 per trip outbound. The overall productivity of the Walpole Center extension is only 23 passengers per hour, below the minimum standard of 32 passengers per hour. Thus, elimination of the Walpole Center extension should be considered. Elimination of this service would save over 12 vehicle hours and \$480 daily (\$120,200 annually).

### Increased Service to the Dedham Mall

The Dedham Mall is a major demand generator along the route; close to 1,300 passengers board or alight Route 34 at the mall and many of these riders are transit-dependent (22 percent are 17 or under, 23 percent are 65 or older, 96 percent have no car available for the trip, 58 percent do not have a driver's license, and 54 percent earn less than \$15,000 annually). Currently, most service to the mall is provided at 30 minute headways (headways range from 15 minutes to 60 minutes), and during the PM peak only one trip is provided outbound via the mall. Additionally, passengers appear reluctant to ride the other Route 34 variations to the mall because no stop is provided at the Washington Street entrance to the mall (only 22 passengers currently use the stops immediately preceding and following the mall for shopping purposes).

Service to the Dedham Mall could be increased at low cost by adding a stop on Washington Street at the mall entrance to the Route 34 variations which currently do not operate into the mall or by rerouting service to the mall. Options for rerouting service via the mall include replacement of Route 34.5 PM peak limited service that passes by the mall with variation 34.7, which operates locally via the mall, or by extension of Route 34.0 PM peak trips to

---

<sup>30</sup>The first AM trip of Route 34.9 operates to Walpole Center.



the mall. In both cases, existing variations 34.7 and 34.8 trips would continue to operate. Extension of either variation 34.0 or 34.5 to the mall would add 0.6 miles and four minutes running time in each direction. Further, larger ridership gains from increasing service to the mall could be achieved if parking spaces were made available to bus riders for park and ride (see discussion of park and ride service).

The least expensive and least disruptive approach to increasing service to the Dedham Mall would be the addition of a stop at the Washington Street entrance to the mall. This stop would add minimal running time to the route, yet would provide increased access to a major demand generator along the route. No additional vehicles would be required.

**Replacement of Variation 34.5 PM Peak Trips with Variation 34.7**

Replacement of 34.5 trips with 34.7 via the mall during the PM peak (this service would not be added to the early AM or AM peak because the mall is closed during those periods) would reduce service headways to the mall from 21 minutes to nine minutes. This change would also increase service frequency on the segment between LaGrange Street and Forest Hills by providing more local service. Replacement of these trips would cost a maximum of \$5,800 (assuming travel time differences between local and limited service are equal to book time differences) and a minimum of \$3,500 (assuming no difference between limited and local travel times).

The reduced headways to the Dedham Mall and on the northern-most segment of the route would lead to net ridership gains of between 100 and 105 new riders, and would result in total savings of 15.4 hours of passenger wait time. However, the diversion to the mall would add four minutes of travel time to existing trips, which begin north of the mall and end south of the mall. This increase in travel time would lead to a loss of five existing passengers and would increase travel times by four minutes for the remaining 195 passengers who currently travel from north of the mall to south of the mall. Therefore, the net increase would be 95 to 100 new trips per day.

**Extension of Variation 34.0 PM Peak Trips to the Dedham Mall**

Dedham Mall service could be increased for trips to or from the northern end of Route 34 by extending 34.0 PM peak trips to the mall. This change would not affect existing headways on variation 34.0, but would reduce headways to the mall from 21 to seven minutes. This headway reduction would lead to a gain of 45 new riders, and would save 14.7 hours of passenger wait time. The extension of Route 34.0 during the PM peak would be possible within existing cycle times, and would only cost \$2,500 per year (see also Table 7-5).

Alternatively, variation 34.0 trips could be extended to the Dedham Mall throughout the day (particularly if park and ride service is provided as

**Table 7-5**  
**Comparison of Alternatives for Increasing Service to the Dedham Mall**

	<u>Alternative 1</u>	<u>Alternative 2</u>	
	<u>Replace Rt 34.5</u>	<u>Extend Rt 34.0</u>	<u>Extend Rt 34.0</u>
	<u>with Rt 34.7</u>	<u>PM Service</u>	<u>All Service</u>
<u>Ridership Gains</u>			
Reduced Headway to Mall	50	45	345
Reduced Headway North of LaGrange	<u>65</u>	<u>--</u>	<u>--</u>
Total Ridership Gain	115	45	345
<u>Ridership Losses</u>			
Due to Increased Travel Times	10 - 15	--	5
<i>Net Ridership Gain</i>	<i>100 - 105</i>	<i>45</i>	<i>340</i>
<i>Annual Operating Cost Impact</i>	<i>\$3,500 - \$5,800</i>	<i>\$2,500</i>	<i>\$2,300</i>
<i>Passenger Wait Time Savings (hrs)</i>	<i>15.4</i>	<i>14.7</i>	<i>126.5</i>

discussed below). The extension of all variation 34.0 trips would not inconvenience any existing passengers and would increase ridership by 344 passengers and decrease wait time by 126 hours for passengers travelling between the Dedham Mall and north. If adjusted cycle times were implemented, this extension would add negligible vehicle hours and would only cost \$2,300 per year.

**Provision of Park and Ride Service in the Route 128/Washington Street Area**

The effective service coverage of Route 34 could be increased to areas currently unserved by transit by providing a park and ride facility in the vicinity of Route 128 and Washington Street. This facility, because it would be located near Route 128, would be easily accessible to numerous auto commuters from surrounding towns. A potential site for this facility would be the Dedham Mall parking lot because it is conveniently located near Route 128 and a parking lot already exists. Park and ride parking and an additional stop on the Dedham Mall variations of Route 34 could be provided in a remote location of the Dedham Mall parking lot to allow parking spaces close to the mall to remain free for mall patrons. Dedham Mall service would be extended to the AM peak to facilitate work trips, but would only stop at the remote park and ride stop. This idea could be explored with the managers of the mall, and could be developed using a joint (MBTA - Dedham Mall) marketing program.

Ridership levels would be partially dependent upon the number of spaces available. Because this modification would be attracting auto commuters

from areas currently not served by MBTA buses, it is difficult to define the service area and thus, expected ridership. However, the service could be implemented at little or no cost (depending upon negotiations with the mall owners), and could potentially serve a broad range of commuters who currently drive to work. Depending on ridership levels attained from this service, future consideration could be given to providing express (non-stop) service between the mall and Forest Hills.

### Coordination of Route 34 Variations

During most time periods, the variations of Route 34 service are not coordinated, and irregular headways occur. Additionally, two buses sometimes travel together along the route. In some cases variations cannot be coordinated to provide even headways along the shared portion of the route due to differences in running times and required service levels. In other cases, coordinated services may result in unbalanced loads and crowding on the longer routes. However, some service could be improved by coordinating schedules to provide consistent headways or scheduling variations to balance loads.

- Early AM During the early AM, service is provided with variation 34.0 (with the exception of one 34.9 trip, which is through-routed with a 34.0). Variation 34.6 operates outbound, but mainly for the purpose of sending vehicles out to East Walpole in order to serve the AM peak. Thus, no coordination between variations is required.
- AM Peak The greatest potential for coordinating schedules occurs during the morning, where versions 34.0 and 34.3 could both be run at 20 minute headways (for 10 minute headways on the shared segment). However, inbound service is provided with variations 34.0 and 34.3 which only overlap between the Dedham line and LaGrange Street; variation 34.3 provides only limited service for the remainder of the route. Thus, coordination would result in inconsistent headways above LaGrange Street. While existing AM peak headways are not fully coordinated, they permit every limited inbound trip (variation 34.3) to be followed by a local 34.0 trip to continue even headways on the limited operation segment.
- Base Variations 34.0 and 34.8 are currently coordinated to provide outbound service at 15 minute headways and inbound service at a consistent pattern of 18 and 12 minute headways.
- School Inbound service is provided with variations 34.0 and 34.8 while outbound service is provided with variations 34.0 and 34.3. Because variations 34.8 and 34.3 are longer routes, coordinated schedules could lead to crowding on these variations. These trips should follow 34.0



trips at a shorter interval in order to balance loads by picking up less passengers north of the Dedham line.

- PM Peak Similar to the AM peak, PM peak headways of variations 34.0 and 34.5 should not be coordinated, because coordination would lead to inconsistent headways between Forest Hills and LaGrange Street. The existing schedule provides a consistent headway pattern along the route during the time that variation 34.5 operates.
- Evening Outbound evening service is coordinated throughout most of the period. Inbound service could not be coordinated without significant impacts.

### Coordination of Walpole Center Service with Commuter Rail

Most Route 34 service is not well coordinated with commuter rail service at Walpole Center during the AM and PM peaks. With some minor schedule changes to Route 34, connections to and from commuter rail could be improved to minimize wait time. In the morning, shifts of up to eight minutes would be required to coordinate inbound rail and bus schedules. In the evening, shifts of up to three minutes would be required. With these changes, Route 34 could provide both feeder service to commuter rail (from outbound Route 34 trips to inbound commuter rail to serve work trips from Walpole to Boston) as well as distributor service from commuter rail (from inbound train service to inbound Route 34 service). Table 7-6 summarizes the changes required to coordinate bus and rail service.

**Table 7-6**  
**Schedule Changes Required to Coordinate Route 34**  
**with Commuter Rail at Walpole Center**  
**(All Times Are Those at Walpole Center)**

Franklin Line Commuter Rail	Route 34					
	Inbound			Outbound		
	Variation	Existing Depart	Adjusted Depart	Variation	Existing Arrival	Adjusted Arrival
<u>AM Peak</u>						
6:11 Inb	34.3	6:15	6:16	34.4	6:05	6:06
7:01 Inb	34.3	6:58	7:06	34.4	6:58	6:56
7:29 Inb	34.3	7:34	7:34	34.4	7:16	7:24
8:00 Inb	34.3	8:10	8:05	34.4	8:00	7:55
<u>PM Peak</u>						
5:48 Outb	34.7	6:10	6:03	34.5	5:45	5:43
6:22 Outb	34.7	6:25	6:27	34.5	6:15	6:17

To reduce the inconsistencies in headways between other Route 34 trips that these changes could cause, two other Route 34.0 departures would have to be shifted as well. The 6:56 am inbound trip would be shifted to 6:57 am and the 6:55 pm inbound trip would be shifted from to 6:53 pm. Other trips would not be negatively impacted by the shifted schedules.

## RELIABILITY

Service on Route 34 is generally reliable: 93 percent (224) of all (240) scheduled trips in the spring of 1986 departed on time. On-time departure performance was 93 percent for the 152 variation 34.0 trips. Variation 34.3 showed the worst on-time departure performance, with 88 percent (14) of the 16 daily trips departing on time. All other variations had 100 percent on-time performance in Spring 1986, with the exception of variation 34.8, which had 93 percent (38) on-time departures. The worst time of day for on-time departure performance for all variations occurs during the AM peak, where 91 percent of the 56 scheduled trips departed on-time. There were more early departures (12) than late departures (3). The source of late and early departures could not be determined, as most book times and layover/recovery times were greater than necessary.

On Route 34.0, average actual running times are greater than scheduled times inbound in the Early AM period, less than scheduled times both inbound and outbound in the AM peak and evening periods, and less than scheduled time outbound in the Early AM, base and school periods. Modification of the book times to reflect the actual observed running times (shown in Table 7-7) would improve schedule adherence and on-time performance. These modifications would also result in reduced cycle times and, in many cases, lower vehicle requirements. On Route 34.0, one bus could be saved in the AM peak, one during the school period, three during the PM peak and one during the evening. Overall, these changes would save \$54,400 annually.

On the Walpole variations, improvements in on-time performance could be achieved by modifying the book times to reflect observed times. Based on Spring 1986 running time data (prior to extensions to Walpole Center), the differences between average observed running times and book times<sup>31</sup> suggest the need for changes in book times (for the segment of the route north of the East Walpole terminal).

- Route 34.2 Reduce outbound scheduled run time from 7:00 am to 10:59 am by seven from 45 to 38 minutes.

---

<sup>31</sup>See Technical Supplement 2 for more detailed running time information.

**Table 7-7**  
**Route 34.0 Schedule Statistics<sup>32</sup>**  
**(All Figures in Minutes)**

	<u>3:00am- 6:59am</u>	<u>7:00am- 8:59am</u>	<u>9:00am- 1:59pm</u>	<u>2:00pm- 5:59pm</u>	<u>6:00pm- 8:29pm</u>	<u>8:30pm- 2:59am</u>
<u><i>Inbound</i></u>						
Scheduled Run Time	14	20	16	16	15	14
Observed Run Time	16	19	16	18	14	11
STD of Obs Run Times	2.3	2.7	3.1	2.5	3.2	2.1
<u><i>Outbound</i></u>						
Scheduled Run Time	19	19	19	23	19	19
Observed Run Time	14	15	18	22	19	14
STD of Obs Run Times	3.6	1.6	2.9	2.1	1.3	1.9
<u><i>Round Trip</i></u>						
Scheduled Cycle Time	40	54	45	56	60	60
Sched RT Run Time	33	39	35	39	34	33
Obs RT Run Time	30	34	33	39	33	25
Sch Recovery Time	7	15	10	17	26	27
Obs Recovery Time	10	20	12	17	27	35
STD * 1.5	9	6	9	7	7	6
Optimum Cycle Time	39	40	42	46	40	31

- Route 34.3 Increase outbound scheduled run time from 2:00 pm to 5:59 am by four from 47 to 51 minutes.
- Route 34.5 Increase outbound scheduled run time from 2:30 pm to 5:59 pm by six from 45 to 51 minutes.
- Route 34.6 Decrease outbound scheduled run time from 3:00 am to 6:59 am by eight from 43 to 35 minutes; decrease inbound scheduled run time from 7:00 am to 8:59 am by 12 from 44 to 32 minutes; decrease outbound scheduled run time from 8:30 pm to 2:59 am by three 37 to 34 minutes.
- Route 34.8 Decrease inbound scheduled run time from 7:00 am to 8:59 am by 15 from 48 to 33 minutes; decrease outbound scheduled run time from 7:00 am to 8:59 am by three from 47 to 44 minutes; decrease inbound scheduled run time from 9:00 am to 1:59 am by three from 48 to 45 minutes.

<sup>32</sup>Spring 1986



- Route 34.9 Decrease outbound scheduled run time from 8:30 pm to 2:59 am by five from 23 to 18 minutes.

On Routes 34.3 and 34.5, the running time increases could be made within existing cycle times. On the other variations, running time decreases would permit cycle times and vehicle requirements to be reduced. Vehicle savings and cycle time reductions achievable from the modifications to Routes 34.2 through 34.9 would be dependent on other scheduling changes made concurrently. Many of these variations operate in only one direction during any given period, and cycle times are therefore dependent on the interlined route, which often varies from one run to the next. Estimates of vehicle savings were developed under simplifying assumptions about route variation combinations<sup>33</sup> during each period and estimated cycle times. These estimates are summarized in Table 7-8.

Table 7-8  
Route 34: Recommended Schedule Changes

---

	<u>AM Peak</u>	<u>Base</u>	<u>School</u>	<u>PM Peak</u>
Current Cycle Time <sup>34</sup>	108	110	113	105
Current Headway <sup>35</sup>	16	30	26	16
Current Vehicles <sup>36</sup>	7	4	5	7
Revised Cycle Time	92	106	110	109
Revised Vehicle Requirements	6	4	5	7

---

### LEVEL OF SERVICE

Headways on the nine variations of Route 34 range from eight minutes (in the PM Peak on variation 34.0) to 63 minutes (in the evening on variation 34.6). The most heavily served segment of the route is the portion between the Dedham line and Forest Hills. Local service on this segment is provided by variations 34.0, 34.4, 34.6, and 34.7 for combined peak period headways of

---

<sup>33</sup>Estimated cycle times are based on the most prevalent combination of variations operating during each period. In cases where observed running time data were not available for one of the variations, scheduled times were substituted.

<sup>34</sup>Sum of allowed times for combined variations.

<sup>35</sup>Based on variation with lower headway.

<sup>36</sup>Based on calculated cycle times if all trips were provided using the same combination of variations and no interlining.

six minutes in the peak direction, and off-peak headways of between seven and 27 minutes. This service is supplemented by variations 34.3 and 34.5, which provide only limited service between LaGrange Street and Forest Hills. However, if these variations are changed to 34.4 and 34.7, effective headways on this segment of the route would be reduced.

Combined peak headways on the remainder of the line are 19 minutes in the AM peak and 17 in the PM peak. Off-peak headways range from 17 to 30 minutes on the Walpole Center segment of the route, with very little service provided in the evening. The last inbound trip from Walpole Center leaves at 7:40 pm and after 6:35 pm only two trips are provided to Walpole Center (one at 10:10 pm and one at 11:10 pm).

With a 15 percent increase in ridership, crowding may occur on individual trips throughout the day and during the peak half-hour, but most off-peak passengers should have a seat. During the AM peak inbound, observed average peak loads of 36 passengers would have increased to 41, and during the school period outbound, average peak loads would increase from 38 to 44 passengers. During the peak half-hour of each of these periods, average loads would have increased to 58 in the AM peak and 62 in the school period. Based on a seating capacity of 40, this would result in loads of 145 percent and 155 percent of seated capacity. However, since the peak load occurs one to two stops from Forest Hills, the crowding is of short duration.

#### Recommended Level of Service Changes If Walpole Center Service Is Maintained

Several low cost changes could be made to Route 34 to improve the route's productivity and relieve crowding. These changes, which include modifications to the variations currently running, as well as the current frequencies, are described below and summarized in Table 7-9.

**Early AM** Early AM service is provided by variations 34.0, 34.3 (inbound only) and 34.4 (outbound only) for average headways of 20 minutes between Walpole Center and the Dedham line and 15 minutes between the Dedham line and Forest Hills. The scheduled cycle time on Route 34.0 is 40 minutes during this period with an average headway of 17 minutes; three vehicles are deployed. Cycle times could be reduced to 39 minutes on Route 34.0 during this period, allowing service to be provided at 13 minute headways with three buses or at 20 minute headways with two buses. Given the low levels of ridership during this period, headways should be increased to 20 minutes to save one bus and \$7,000. This change in headway would result in the loss of five passengers.

Additionally, 34.5 trips should be rescheduled as 34.4 trips to increase service coverage between LaGrange Street and Forest Hills. This

**Table 7-9**  
**Route 34: Summary of Recommended Level of Service Changes**

	Weekday Ridership Impact	Cost Impact	Impact on Pax Wait Time (hrs)	Impact on Veh Hours	$\Delta$ Pax Wait Time/ $\Delta$ VSH
<u>Early AM:</u>					
1. Reduce 34.0 cycle time and increase headway	-5	+\$7,000	+1.0	-2	0.5
2. Reschedule 34.5 trips as 34.4 trips	+4	+\$500	-0.9	+0.1	0.9
<u>AM Peak:</u>					
1. Reduce 34.0 cycle time and increase headway	+32	-\$32,400	-10.7	+1.4	7.6
2. Reschedule 34.3 trips as 34.4 trips	+38	+\$1,800	-16	+0.5	32
<u>Base:</u>					
No changes recommended					
<u>School:</u>					
Reduce 34.0 cycle time and reduce headway	+12	-\$4,400	-2.4	+1.2	2
<u>PM Peak:</u>					
1. Reduce 34.0 headway	+5	+\$12,300	-1	+2	0.5
2. Reschedule 34.5 trips as 34.7 trips	+65	+\$3,500	-15.8	+0.7	22.6
<u>Evening:</u>					
Increase 34.0 headway	-22	-\$67,300	+9.8	-3.2	3.1

service increase would cost less than \$500 per year and would increase ridership by five passengers.

**AM Peak** The segment between the Dedham Line and Forest Hills shows some crowding during this period. This crowding can be reduced by increasing Route 34.0 service. Route 34.0 headways could be reduced from nine minutes to eight minutes during this period within a 40 minute cycle time. This reduction in cycle time to better reflect actual running and recovery time required would allow service to be increased with cost savings of \$32,400 annually. The reduction in headways is expected to increase ridership by three percent (30 new riders). Additionally, service coverage could be increased by running variation 34.3 as variation 34.4. Assuming that actual travel times on variation 34.3 are no less than those on variation 34.4, the change to 34.3 could be implemented at no cost. However, even if the difference in travel time



between 34.3 and 34.4 is as great as the difference in book times, this change would cost only \$1,800 per year and would increase ridership by 40 passengers.

**Base** Although passenger volumes could be accommodated with longer Route 34.0 headways during this period, headways should remain at 22 minutes. While the lengthening of headways to 42 minutes could save one vehicle and 3.6 vehicle hours, the longer headways would result in a 20 percent loss in riders and an increase of 18.9 hours of passenger wait time per vehicle hour saved. Ridership volumes on variation 34.7 during this period could also be accommodated with longer (42 minute) headways than the current 22 minutes. However, similar to variation 34.0, 25 percent of the riders would be lost and passenger wait times would increase 11.4 hours for each of the 11.9 vehicle hours saved.

**School** Fourteen minute outbound headways are currently provided on variation 34.0 with five buses. Reduction of the cycle time from 56 minutes to 46 minutes would permit 12 minute headways using only four buses. This change would increase ridership slightly, but more importantly, it would relieve crowding during the school period by adding one more trip. Implementation of this change would result in cost savings of \$4,400 per year, and would reduce passenger wait time by eight hours for every additional vehicle hour required.

**PM Peak** Service during the PM peak is provided by variations 34.0, 34.3 (one trip), 34.5 (OB), and 34.7 (IB). Some outbound crowding exists during this period, and could be relieved by reducing 34.0 headways from eight minutes to seven minutes and replacing 34.5 service with 34.7 service. These changes would reduce the effective average headways on the northern, most congested part of the route (above the Dedham line) from seven to 5.5 minutes, and would attract 70 new riders. These changes would cost \$15,800 per year.

**Evening** Evening service is provide by variations 34.0, 34.3 (one trip), 34.6 (OB), 34.7 (IB), 34.8, and 34.9 (IB) for combined average headways on the segment above the Dedham line of 24 minutes. Service is currently underutilized, and significant cost savings could be realized if service reductions were implemented. Variation 34.0 headways could be increased from 48 minutes to 62 minutes, saving \$67,300 per year. This change would only increase combined average headways on this segment to 26 minutes, and 22 passengers would be lost.

### Recommended Level of Service Changes If Walpole Center Service Is Eliminated

Should the recommendation to eliminate Walpole Center service be implemented, the Spring 1986 schedule should be used as a base for determining how service can be improved. As was previously discussed, some crowding exists during the peak periods and on individual trips throughout the day. The following set of recommendations is based on improvements to the Spring 1986 schedule because this schedule is less complicated (in terms of combining variations and interlining) than the current schedule, and it does not include service to Walpole Center.

**Early AM** The Spring 1986 ridechecks showed crowding on the one early am trip (5:45) to East Walpole (all other early am trips only operated to the Dedham Line). Two approaches could be taken to alleviate the crowding on this run: (1) add another long trip, prior to the 5:45 to capture some of the East Walpole passengers, or (2) add a 34.0 trip inbound prior to the long trip in order to reduce the number of passengers boarding the long trip north of the Dedham line. The second option is less expensive and provides adequate capacity.

Of the 71 passengers riding the 5:45 bus inbound from East Walpole in the Spring of 1986, 33 boarded south of the Dedham line. This level of ridership does not justify the addition of a long trip. The remaining 38 passengers could be served equally as well by a 34.0 (short) trip. In order to balance loads between the long and (new) short trip, the short trip should be inserted to capture a majority of the riders north of the Dedham line. Insertion of an inbound 34.0 at 6:09 would catch 31 of the 38 passengers boarding north of the Dedham line leaving only seven to board the long trip. The cost of the additional trip would be small and dependent on how it is scheduled (i.e. whether or not it can be scheduled using existing vehicles or if an additional vehicle is required).

**AM Peak** Crowding occurs on some of the short (34.0) runs during the AM Peak. This crowding could be relieved, to a limited extent, by operating 34.3 trips as local trips making all stops above LaGrange Street. However, in order to prevent crowding on the 34.3 trips, the schedule would have to be adjusted to ensure that 34.3 trips follow 34.0 trips at a smaller headway than between 34.3 trips and the succeeding 34.0 trip. Given the differences in travel times, this schedule could not be implemented without significant service level changes.

A second approach to relieving crowding on the northern end of the route would be to slightly reduce 34.0 and 34.3 headways and, to the extent possible, run 34.3 trips locally following 34.0 trips to balance loads. This can be accomplished by reducing 34.0 headways from 9 to 8 minutes and

operating 34.3 at even 15-minute intervals throughout the period. A sample schedule is provided in Figure 7-4, incorporating revised running times based on those observed in the Spring of 1986. These changes would only cost \$13,100 per year, and would reduce crowding. To the extent that 34.3 trips can be shifted within scheduling to run at a short interval behind 34.0 trips, crowding would be reduced even further by operating 34.3 trips locally.

**Figure 7-4**  
**Route 34: Sample Inbound AM Peak Schedule**

<u>Variation</u>	<u>Departure Time</u> <u>East Walpole</u>	<u>Departure Time</u> <u>Dedham Line</u>	<u>Arrival Time</u> <u>Forest Hills</u>
34.0	—	6:00	6:19
34.0	—	6:22	6:41
34.0	—	6:33	6:52
34.3	6:15	6:37	6:56
34.0	—	6:44	7:03
34.0	—	6:52	7:11
34.3	6:30	6:52	7:11
34.0	—	7:00	7:19
34.3	6:45	7:07	7:26
34.0	—	7:08	7:27
34.0	—	7:16	7:35
34.3	7:00	7:22	7:41
34.0	—	7:24	7:43
34.0	—	7:32	7:51
34.3	7:15	7:37	7:56
34.0	—	7:40	7:59
34.0	—	7:48	8:07
34.4	7:30	7:52	8:11
34.0	—	7:56	8:15
34.0	—	8:04	8:23
34.3	7:45	8:07	8:26
34.0	—	8:12	8:31
34.0	—	8:20	8:39
34.3	8:00	8:22	8:41
34.0	—	8:28	8:47
34.0	—	8:36	8:55
34.0	—	8:44	9:03

School Slight crowding was observed during the school period in the Spring of 1986. This crowding is generally of short duration and does not violate crowding standards. However, loads are unbalanced between buses, and some improvements can be made, at little or no cost, to balance the loads on school period buses. Inbound loads could be balanced by rescheduling 34.0 trips at even 15-minute intervals which would allow 34.8 trips to follow 34.0 trips at a smaller headway. By reducing the amount of time between the 34.0 and 34.8 trips, fewer



passengers would board 34.8 on the northern segment (assuming evenly distributed arrival times). This revision does not include any new trips; it merely shifts existing trips and therefore comes at no cost. A revised School period schedule is displayed in Figure 7-5. Any improvements to outbound school service levels would require additional trips, which are not warranted because the loading standards are not exceeded.

---

**Figure 7-5**  
**Route 34: Revised Inbound School Schedule**

<u>Variation</u>	<u>Departure</u>	<u>Arrival</u>
34.0	14:20	14:38
34.0	14:35	14:53
34.8	14:05	14:54
34.0	14:50	15:08
34.0	15:05	15:23
34.8	14:35	15:24
34.0	15:20	15:38
34.0	15:35	15:53
34.8	15:05	15:54
34.0	15:50	16:08
34.0	16:05	16:23
34.8	15:35	16:24

---



---

## 8. West Roxbury and Roslindale Service

---

In addition to Route 30, which was examined in Chapter 4, most service to West Roxbury and Roslindale residential areas is provided by five routes:

- Route 35: Dedham Line/Dedham Mall - Forest Hills
- Route 36: Charles River Loop - Forest Hills
- Route 37: Baker/Vermont Streets - Forest Hills
- Route 38: Wren Street - Forest Hills
- Route 51: Cleveland Circle - Forest Hills

Additional service is provided along Washington Street through both areas on Routes 34, 40 and 50. However, these routes are designed to primarily provide trunk service along Washington Street (Route 34), or service to residential areas in Hyde Park (Routes 40 and 50).

The Roslindale and West Roxbury routes, as with most other SOUTHBus routes, are used largely for travel to and from downtown Boston, Roslindale, Jamaica Plain and West Roxbury. The largest number of these trips are to and from downtown Boston (42 percent), Roslindale (18 percent), West Roxbury (11 percent), and Jamaica Plain (10 percent). For work trips, there is a greater emphasis on downtown Boston trips, with 60 percent of all trips on the four routes to and from downtown. These work trip patterns are generally consistent with work trip patterns made by all residents of West Roxbury and Roslindale to locations within the MBTA service area, for both transit users and non-transit users alike.<sup>37</sup> However, the population in general makes a higher percentage of trips within West Roxbury and Roslindale than do transit riders.

During the BTD's transportation workshops, residents of West Roxbury expressed a desire for better service for trips made within West Roxbury (primarily between residential areas and the Centre Street business district), as well as better bus connections and coordination of bus trips with commuter rail. Residents of Roslindale expressed a desire for better coordination of the routes that serve that area (presumably also to improve local trip making opportunities since frequent, direct service to Forest Hills is already provided).

---

<sup>37</sup>Based on 1980 U.S. Census data.



As usage indicates, existing service is designed primarily to serve the major travel flows to downtown Boston through Forest Hills. This is due to a number of factors. First, most of the demand is for service to downtown Boston. This market is much larger than the local market, at approximately 6,500 daily work trips from West Roxbury compared to 2,800 daily local work trips (based on 1980 U.S. Census data). Second, the greater availability and lower cost of parking in West Roxbury and Roslindale makes transit a less attractive alternative in the local market than in the downtown Boston market, which reduces the potential transit share. Also, because of the short distances involved in local travel, wait times become a larger part of the total transit travel time, often further increasing the travel time differential between transit and automobiles.

As a result, there has been less emphasis on providing local service. Further, use of existing bus service in West Roxbury and Roslindale (Routes 35 and 36, as well as Routes 37 and 38) for local trips is fairly light, at only 28 percent of total ridership. By route, local ridership in West Roxbury and Roslindale ranges from 175 trips per day on Route 38 to 900 daily trips on Route 36. In the areas directly served by the four routes, the resulting transit mode split for local work trips<sup>38</sup> is 16 percent, compared to 49 percent to downtown Boston. These figures, combined with relatively few work trips made within the area, indicate that new routes that provided only local service, such as a loop around West Roxbury, would be lightly utilized.

Since it is not likely that a purely local route could be operated efficiently, local service in Roslindale and West Roxbury should continue to be provided with the routes that feed Forest Hills. This local service could be improved without significantly worsening Forest Hills feeder service by routing additional service through the Centre Street business district and by increasing local service coverage on existing routes.

Existing service connects three residential areas with the Centre Street business district—Route 35 along Spring Street as far as the VFW Parkway and the VA Hospital, Route 36 along Centre Street, Stimson Street and Washington Street as far as the Dedham Mall, and Route 37 to the Baker and Vermont Street area. Route 38 also provides service from the Bellevue-Mount Vernon area to Centre Street, but this service runs east of the business district. Route 51 serves the Weld Street area, but travel to West Roxbury Center from this route is possible only through a transfer with Route 38. "Cross-town" service through West Roxbury Center is provided only along Centre Street towards Roslindale Square. There is no cross-town service

---

<sup>38</sup>For these purposes, local work trips are considered those that begin and end within one-quarter mile of any of the four routes.

between areas north of Centre Street and areas between Centre Street and Washington Street.

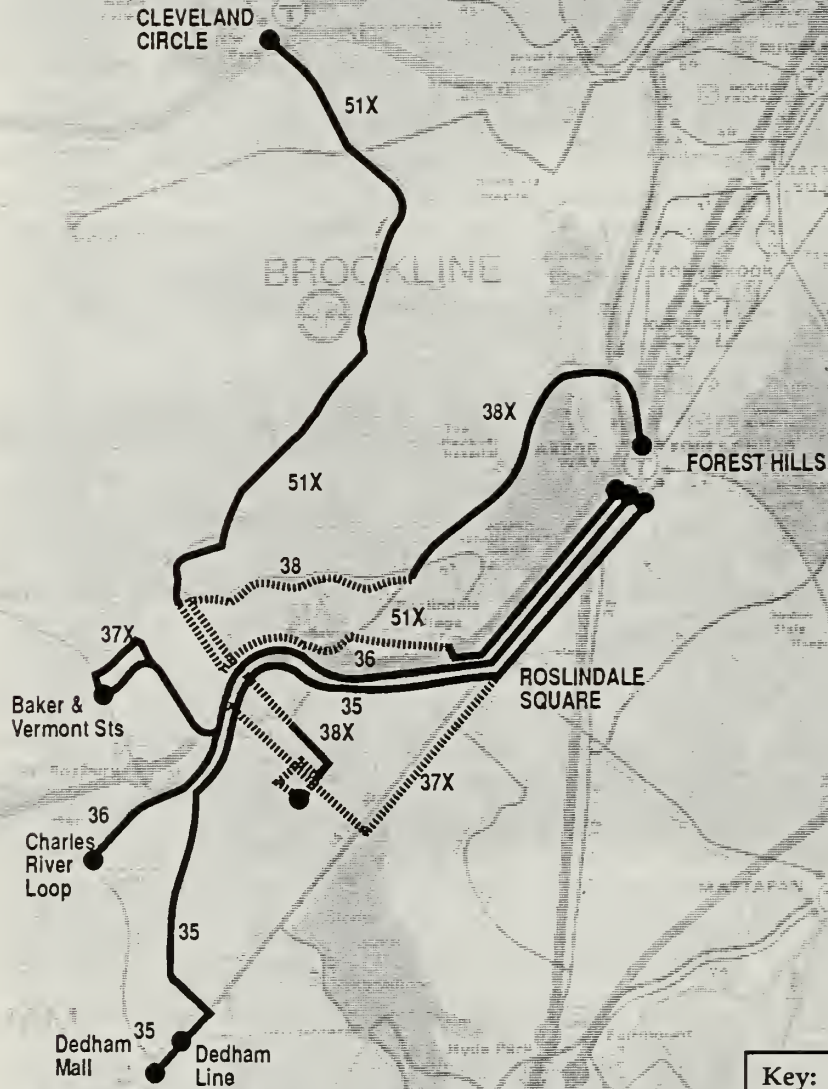
Of these routes, Routes 35 and 36 provide the most direct service from their service areas to West Roxbury Center, Roslindale Square and Forest Hills. Due to the orientation of these routes (southwest to northeast), it would not be possible to realign them to provide other cross-town service. Further, as discussed below, there is also a need to maintain a high level of service between West Roxbury Center and Roslindale Square. As a result, these two routes should maintain their current alignments.

Routes 37, 38, and 51 could be rerouted to provide service through the business district and to provide better connections with commuter rail. As shown in Figure 8-1, Route 37 could be modified to provide cross-town service and additional feeder service to the West Roxbury commuter rail station by rerouting to continue straight along LaGrange Street to Washington Street, and then up Washington Street to Forest Hills. (For the purposes of this analysis, this route is called Route 37X.) This realignment would take some service off of Centre and LaGrange Streets but that same alignment is also served by Routes 35 and 36. It would also establish new direct service to Forest Hills from LaGrange Street between Centre Street and Washington Street. Route 38 could be rerouted to provide service to the Weld Street area by operating it from Park Street to Corey Street to Weld Street and then along the alignment of Route 51 to Centre Street, where it would rejoin its present alignment to Forest Hills. This would leave the area along Centre Street between Belgrade Avenue and Weld Street unserved. However, since the revised Route 38 (called Route 38X) would duplicate Route 51 service along Weld Street, Route 51 could then be moved to serve that area. Beyond Forest Hills, Route 51 could stay on South Street to Centre Street to Corey Street, where it would then rejoin its existing alignment. This realignment would also link West Roxbury's business district with Cleveland Circle and the Green Line. At the BTD's transportation workshops, connections between West Roxbury and Chestnut Hill were also discussed. This change to Route 51 (called Route 51X) would make these trips possible, albeit with a transfer. These reroutings are discussed in the following chapters.

In Roslindale, service coverage is good, and it is possible to travel to Roslindale Square from nearly all areas. In addition, with the exception of Route 30, all routes that serve Roslindale also serve Forest Hills. However, as discussed in Chapter 4, an extension of Route 30 could be easily implemented. There is no east-west "cross-town" service through Roslindale due to the large demand to and from Forest Hills, and the lack of a large trip attractor west of Roslindale Square. As a result, other than the changes to Routes 37, 38 and 51 described above, no other alignment changes appear to be warranted.



**Figure 8-1  
West Roxbury Alternatives**



**Key:**

Route 37X - Route 37 revised  
 Route 38X - Route 38 revised  
 Route 51X - Route 51 revised

— Unchanged Segment  
 - - - Realigned Segment



---

## 9. Routes 35 & 36

---

*Route 35: Dedham Mall/Stimson Street - Forest Hills*

*Route 36: Charles River Loop/Dedham Line - Forest Hills*

### ROUTE PROFILES

#### Route 35

Route 35 operates between either the Dedham Mall or the West Roxbury/Dedham Line, and Forest Hills through the Bellevue-Mount Vernon area of West Roxbury as well as Roslindale Square (see Figure 9-1). There are two variations of Route 35: 35.0 and 35.1. Route 35.0 operates in the morning before the Dedham Mall is open only as far as the West Roxbury/Dedham Line (approximately one-half mile north of the Dedham Mall), and Route 35.1 operates for the rest of the day. Connections can be made with Routes 34 and 52 at the Dedham Mall, Routes 36 and 37 along most of Centre Street, Routes 30, 33, 34, 36, 37, 40, 50 and 51 at Roslindale Square, and Routes 16, 21, 39, and 42, at Forest Hills. Since October 1987, connections can also be made with commuter rail at the Bellevue and Roslindale Village Stations on the Needham Line.

Headways on the two variations combined are 20 minutes in the AM peak, 30 minutes mid-day, and an average of 13 minutes in the PM peak (see Table 9-1). It is unusual that PM peak headways are shorter than AM peak headways, and ridership does not warrant the extra PM peak service. Since the Spring of 1986 through the Fall of 1987, some minor adjustments have been made to the route's schedule, but neither the total number of trips nor average headways have been affected.

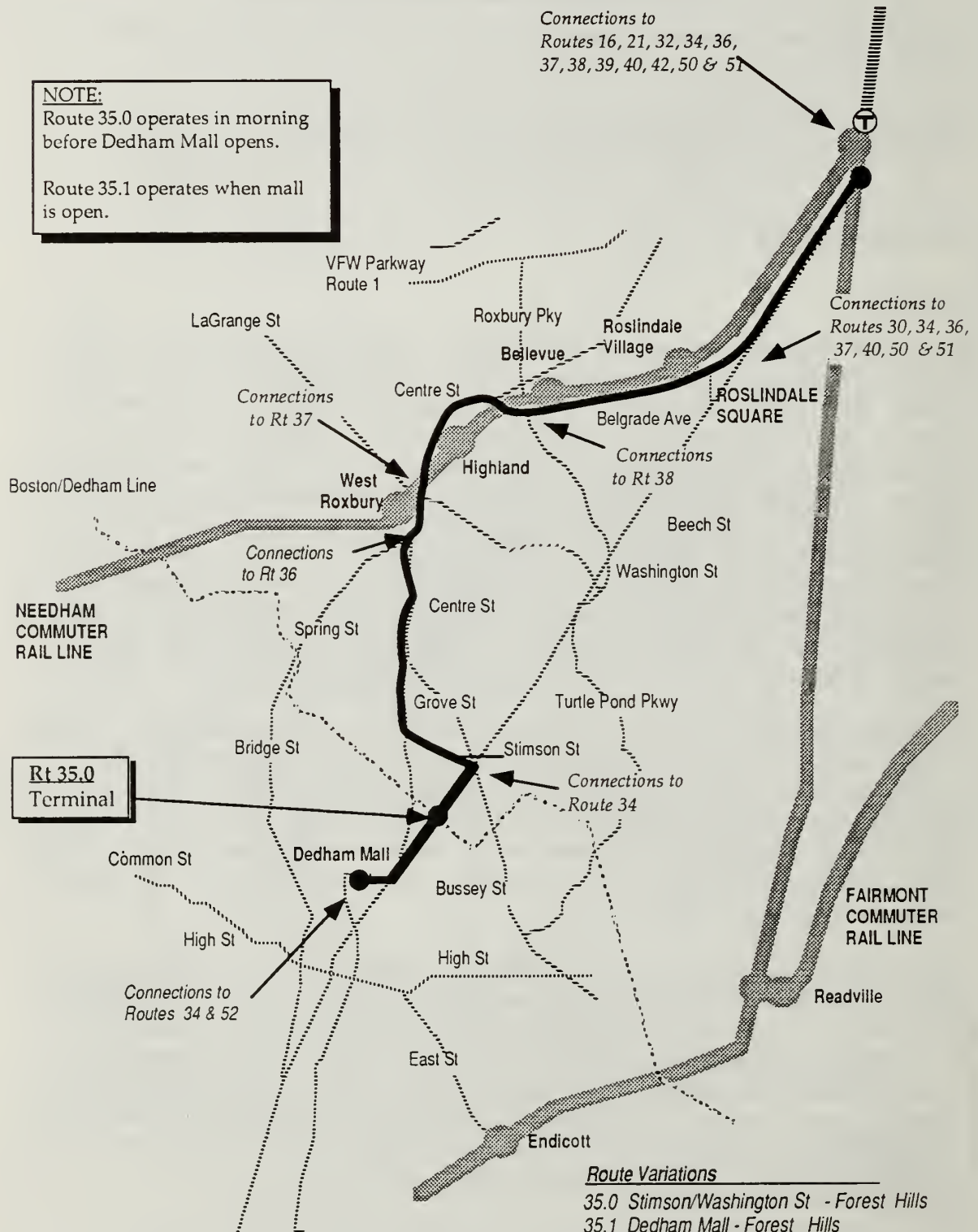
When ridechecked in the Spring of 1986, total ridership on Route 35 was 2,355 trips per day (see Table 9-2). However, since then pointchecks performed at Forest Hills indicate that through the Fall of 1987 ridership in and out of Forest Hills has increased by approximately 45 percent, or 710 passenger trips, from 1,360 trips per day to 2,070 trips per day. This increase in Forest Hills ridership would increase total Route 35 ridership by 30 percent. Pointcheck data collected at other points is not sufficient to estimate changes in other ridership (without a trip end at Forest Hills.)

**Figure 9-1**  
**Route 35: Dedham Mall - Forest Hills**

**NOTE:**

Route 35.0 operates in morning  
before Dedham Mall opens.

Route 35.1 operates when mall  
is open.



**Table 9-1**  
**Route 35 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1987): 5:20 am - 9:05 pm

	Average One-Way Length	One- Way Trips	Avg Headway (Min-Peak Dir)						All Day	
			EA	AM	Base	Sch	PM	Eve	VSM	VSH
<i>Spring 1986</i>										
Rt 35.0	4.6	19	1T	20	1T	--	--	--	92.0	9.7
Rt 35.1	5.1	65	--	--	30	15	13	58	326.4	32.0
<b>Total/Avg</b>		<b>84</b>	<b>1T</b>	<b>20</b>	<b>30</b>	<b>15</b>	<b>13</b>	<b>58</b>	<b>418.4</b>	<b>41.7</b>

*Fall 1987*

No significant changes have occurred.

**Table 9-2**  
**Route 35 Weekday Ridership and Productivity Statistics**

	Weekday Boardings	Boardings/VSM							Boardings/ VSH
		Early AM	AM Peak	Base	Sch	PM Peak	Eve	All Day	All Day
<i>Spring 1986</i>									
Rt 35.0	475	2.5	5.5	8.7	--	--	--	5.2	49.3
Rt 35.1	1,880	--	0.0	6.7	7.1	5.4	2.8	5.8	58.8
<b>Total/Avg</b>	<b>2,355</b>	<b>2.5</b>	<b>5.1</b>	<b>6.8</b>	<b>7.1</b>	<b>5.4</b>	<b>2.8</b>	<b>5.6</b>	<b>56.6</b>
<i>Fall 1987</i>									
<b>Total/Avg</b>	<b>3,065</b>							<b>7.3</b>	<b>73.5</b>
<i>Change</i>	<b>+30%</b>							<b>+30%</b>	<b>+30%</b>

Percent of passengers 65 or older (Spring 1986): 14.0%

Percent without a car available for trip (Spring 1986): 72.3%

Spring 1986 Peak Load Points: Inbound: Washington St @ Aldwin Road

Outbound: Wash. St. opp. Toll Gate Way

With the exception of specific AM peak trips (7:05 am and 7:45 am inbound), current schedules should be adequate to handle these ridership increases. Spring 1986 average peak loads in the AM peak inbound were 35; the



observed increase in the AM peak of eight percent in inbound AM peak ridership would raise these loads to 38 passengers, still less than seated capacity. For outbound school and PM peak service, observed increases would raise average peak loads to 47 and 31, respectively.

With large increases in ridership to Forest Hills, the major function of Route 35 to provide feeder service to the Orange Line and other bus routes has become more important. In the Spring of 1986, 70 percent of all trips involved at least one transfer, and only 30 percent of Route 35's riders walked to and from the route at both ends. Assuming non-Forest Hills ridership has remained relatively unchanged since 1986, the percent of trips involving one or more transfer would have increased to 77 percent. Fifty-eight percent of all trips in 1986 were to and from Forest Hills, where 44 percent of the route's passengers made a transfer with the Orange Line. This percentage of Orange Line transfers has increased to up to 57 percent. Twenty-seven percent of the route's passengers transferred to and from other bus routes, with most transfers made at Forest Hills, Roslindale Square or the Dedham Mall. As of the Spring of 1986, nearly half of all transfers were made with Route 39 (305 per day). Also, 135 transfers per day were made with Route 32, 70 with Route 30, 65 with Route 34, 45 with Route 21, 20 with Routes 40 and 50, 15 with Route 51, and five with Routes 33 and 38.

With most ridership to and from Forest Hills or Roslindale Square, ridership continues to be highly directional. In the AM peak, 81 percent of all 1986 trips are inbound; in the PM peak, the percentage of outbound trips was lower (at 65 percent) due to inbound shopping trips.

A large majority of Route 35 riders are residents of West Roxbury or Roslindale. For work and school trips, 52 percent of Route 35's riders live in West Roxbury and 33 percent live in Roslindale. Most of these riders (92 percent) walk to the route from home. Fifty-four percent of work and school trips are made to downtown Boston, 13 percent to West Roxbury, eight percent to Dedham, five percent to Jamaica Plain, and 20 percent to other locations. As previously discussed, at the inner end, which in most cases is the work end of the trip, over 67 percent of all trips involve a transfer with the Orange Line or another bus.

Transit dependency on Route 35 is slightly below average for the SOUTHBus corridor. As of 1986, relatively few riders were 17 or younger (seven percent), while 14 percent were 65 or older. Seventy-two percent did not have a car available for their trip, and 35 percent were from households with an annual income of \$15,000 per year or less.

## Route 36

Route 36 operates between the Charles River Loop on Spring Street in West Roxbury and Forest Hills via the VA Hospital, the Bellevue-Mount Vernon area of West Roxbury, and Roslindale Square (see Figure 9-2). The route operates along Spring Street, Centre Street through West Roxbury's business district, LaGrange Street, and Washington Street. Between Forest Hills and the intersection of Centre and LaGrange Streets, Route 36 follows the same alignment as Route 37. There are four variations of Route 36:

36.0 Charles River Loop - Forest Hills

36.2 Roslindale Square - Forest Hills

36.3 Dedham Line - Forest Hills

36.8 Charles River Loop - Forest Hills via VA Hospital

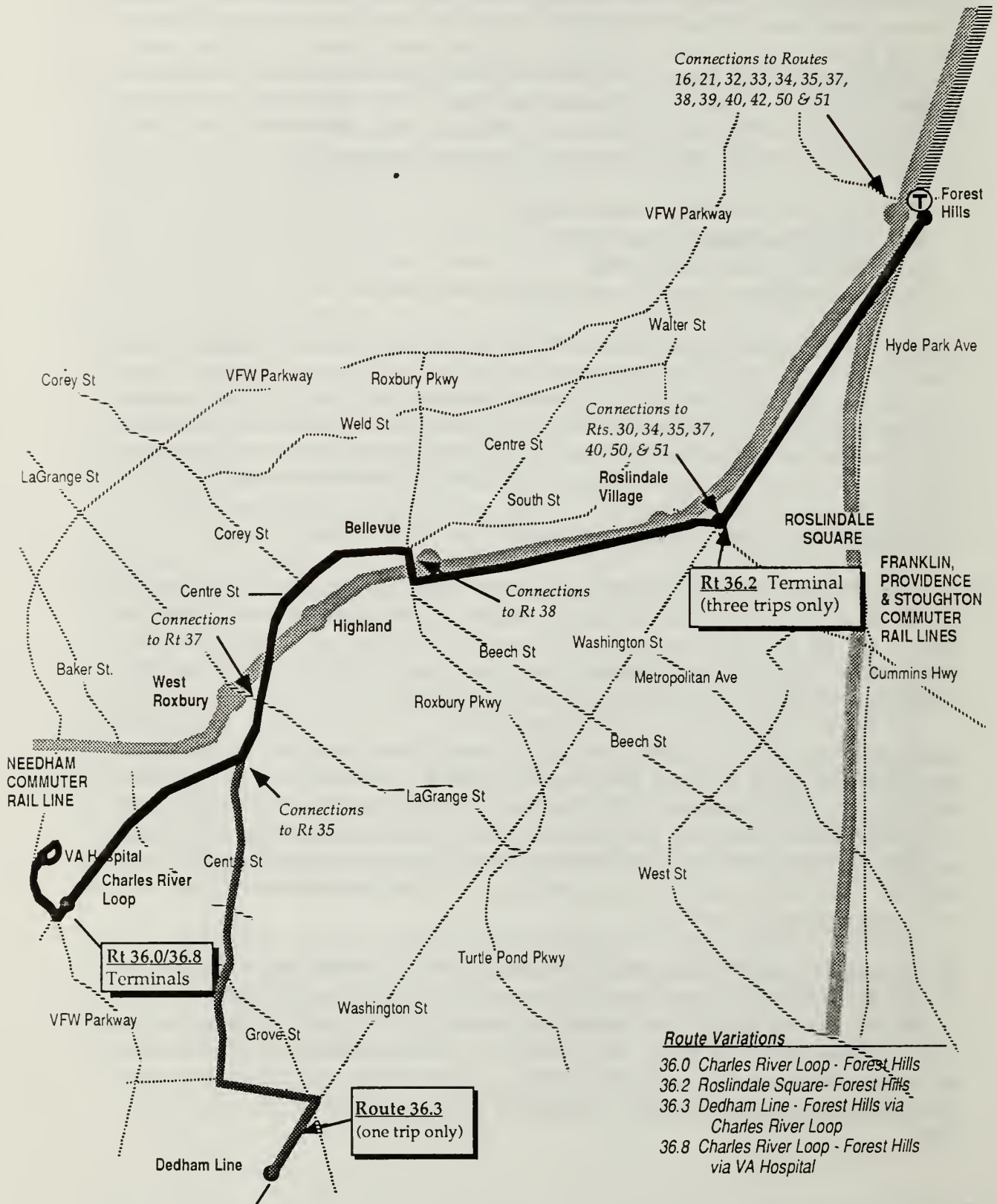
Nearly all service is operated on the Route 36.0 and 36.8 variations. Variations 36.2 and 36.3 are operated for scheduling purposes only. Three daily Route 36.2 trips are due to interlining of Routes 36 and 30, and operate between the terminal of Route 36 at Forest Hills and the terminal of Route 30 at Roslindale Square. Although these trips will stop to pick up and discharge passengers, they do not appear on schedule cards. One daily Route 36.3 trip is scheduled outbound at 1:05 am to the West Roxbury/Dedham line on Washington Street where it becomes the last inbound Route 34.0 trip.

Connections can be made from Route 36 to the Orange Line and Routes 16, 21, 39 and 42 at Forest Hills, Routes 30, 34, 40, 50 and 51 at Roslindale Square, as well as Routes 35 and 37 along Centre Street in West Roxbury. Since October 1987, connections can also be made with commuter rail at the Bellevue and Roslindale Village Stations on the Needham Line.

Route 36.0 operates throughout the day from 4:37 am until 8:48 am and then from 3:45 pm until 1:05 am, plus one additional outbound trip at 1:45 pm. Route 36.8, which operates via the VA Hospital, operates throughout the day between 6:30 am and 7:20 pm. During peak periods, Route 36.0 headways range from two to 36 minutes, and Route 36.8 headways range from 12 to 36 minutes. However, schedules are coordinated so that actual intervals are two to 15 minutes (see Table 9-3).

During the base and school periods, most service is provided by Route 36.8 at 30 minute headways, and evening service is provided with Route 36.0 at mostly 30 minute headways. Since the Spring of 1986, one AM peak round trip has been added on Route 36.8, with the schedules of other AM peak trips on Routes 36.0 and 36.8 adjusted slightly. This change was made to reduce crowding during the AM peak, where peak loads exceeded 60 on a number of trips.

Figure 9-2  
Route 36: Charles River Loop/Dedham Line - Forest Hills





**Table 9-3**  
**Route 36 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1987): 4:37 am - 1:05 am

	Average One-Way Length	One- Way Trips	Avg Headway (Mins-Peak Dir)					All Day	
			AM	Base	Sch	PM	Eve	VSM	VSH
Spring 1986									
36.0	4.9	74	15	1T	1T	24	34	362.6	36.0
36.2	1.4	3	1T	1T	--	--	1T	5.6	0.6
36.3	6.1	1	--	--	--	--	1T	6.1	0.4
36.8	5.6	<u>53</u>	<u>24</u>	<u>30</u>	<u>30</u>	<u>30</u>	<u>2T</u>	<u>294.2</u>	<u>26.5</u>
Total/Avg:		131	11	28	24	14	29	668.5	63.6
Fall 1987									
36.0	4.9	73	15	1T	1T	24	34	362.6	36.0
36.2	1.4	3	1T	1T	--	--	1T	5.6	0.6
36.3	6.1	1	--	--	--	--	1T	6.1	0.4
36.8	5.6	<u>55</u>	<u>22</u>	<u>30</u>	<u>30</u>	<u>30</u>	<u>2T</u>	<u>305.4</u>	<u>27.5</u>
Total/Avg:		131	10	28	24	14	29	679.7	64.6
Change		0%	-9%	0%	0%	0%	0%	-2%	-2%

When Route 36 was ridechecked in the Spring of 1986, daily ridership was 3,175 trips per day. However, as with other Forest Hills routes, pointchecks conducted since the opening of the new Orange Line indicate significant ridership increases since that time. On Route 36, by the Fall of 1987, MBTA pointchecks indicate that ridership to and from Forest Hills has increased 18 percent to 2,510 trips per day, for an increase of 470 trips per day. Adequate ridership data is not available to estimate changes in other ridership segments, but assuming no other significant changes, total ridership on the route would have increased to 3,645 trips per day, an increase of 15 percent (see Table 9-4).

With the increase in Forest Hills ridership, the percentage of trips to and from Forest Hills has increased to up to 69 percent of Route 36's ridership. In addition, assuming that nearly all of the increase to and from Forest Hills is attributable to the new Orange Line (since no other significant changes have occurred there), the number of transfers to and from the Orange Line has increased by 31 percent from 1,495 per day to 1,965 per day. Therefore, in the Fall of 1987, up to 54 percent of all Route 36 ridership is to and from the Orange Line.

Table 9-4  
Route 36 Weekday Ridership and Productivity Statistics

	Weekday Boardings	Boardings/VSM						All Day	Boardings/ VSH All Day
		Early AM	AM Peak	Base	Sch	PM Peak	Eve		
<i>Spring 1986</i>									
36.0	1,430	1.9	6.1	7.2	3.9	4.4	2.5	3.9	39.7
36.2	0	--	0.0	0.0	--	--	0.0	0.0	0.0
36.3	10	--	--	--	--	--	1.3	1.3	18.5
36.8	<u>1,735</u>	<u>--</u>	<u>7.3</u>	<u>5.7</u>	<u>9.0</u>	<u>4.1</u>	<u>2.6</u>	<u>5.9</u>	<u>65.4</u>
Total/Avg	3,175	1.9	6.4	5.7	8.5	4.2	2.5	4.7	49.9
<i>Spring 1986</i>									
Total/Avg	3,645							5.4	56.4
Change	+15%							+15%	+13%

Percent of passengers 65 or older (Spring 1986): 13.0%

Percent without a car available for trip (Spring 1986): 66.2%

Spring 1986 peak load points: Inbound: Washington St @ Aldwin Rd  
Outbound: Roslindale Square

Increases in ridership to and from Forest Hills may be causing crowding problems on outbound school period trips. During this period, Spring 1986 peak loads averaged 50 passengers, and since that time, pointchecks indicate a 33 percent increase in the outbound direction, which would increase peak loads to 67 passengers, or 168 percent of seated capacity. (PM peak loads are significantly lower than school period loads, with Spring 1986 average peak loads of only 24.)

With Route 36 acting as a feeder to and from the Orange Line for most passengers, peak period usage is fairly directional in nature. During the AM peak, 72 percent of all Spring 1986 trips were inbound towards Forest Hills, and during the PM peak, 65 percent were outbound from Forest Hills. During the mid-day, ridership was fairly well balanced between directions, with 55 percent inbound and 45 percent outbound.

As would be expected from the above figures, most Route 36 riders live in West Roxbury (52 percent) and Roslindale (33 percent), and most trips are made to downtown Boston, Roslindale or West Roxbury (based on Spring 1986 survey data; all trip purposes). For work and school trips, 54 percent are made to downtown Boston, 13 percent to West Roxbury, and five percent

each to Jamaica Plain and Roxbury. (Work trips account for half of all Route 36 trips, while shopping and school trips each account for 15 percent.)

As with Route 35, most riders walk to and from Route 36 at the outer end, but make a transfer with the Orange Line or another bus at the inner end (up to 91 percent). In addition to the Orange Line transfers discussed above, 845 bus transfers are also made daily. As with all of the SOUTHBus Forest Hills routes, except Route 51, most transfers are made with Route 39 (315 per day in Spring 1986). In addition, significant numbers of transfers are also made with Route 34 (95), Route 30 (80), Route 21 (50), Route 50 (35), Route 16 (45), and Route 37 (45).

The level of transit dependency of Route 36 riders is slightly below average for the SOUTHBus corridor. While only eight percent are under 18, 13 percent are 65 or older, 72 percent did not have a car available for their trip and 30 percent had annual household incomes of \$15,000 or less. These figures compare to corridor averages of 13 percent younger than 18, 13 percent 65 and older, 74 percent without an automobile available, and 37 percent with incomes of \$15,000 or less.

## SERVICE COVERAGE

### Overall Assessment

Routes 35 and 36 are used largely for travel to and from downtown Boston, Roslindale, Jamaica Plain, and West Roxbury. The two routes share a common alignment between Forest Hills and the intersection of Spring and Centre Streets past West Roxbury's business district. Beyond that point, they split apart and serve largely residential areas and two high schools—Catholic Memorial along Route 36, and Roxbury Latin along Routes 35 and 36. Together, the two routes serve over 5,500 trips per day, making them the third and fourth most heavily used in the corridor. The largest number of these trips is to and from downtown Boston (40 percent), Roslindale (21 percent), and West Roxbury (11 percent). For work trips, there is a greater emphasis on downtown Boston trips, with 59 percent of all trips to downtown.

As discussed in the previous chapter, the basic alignments of both routes are sound and should remain as they are. Both routes provide direct service to the Centre Street business district, Roslindale Square and Forest Hills. There are no alternative alignments that could serve all three locations as well or more quickly, and there are no large trip generators or attractors nearby that are unserved.



However, there are a number of improvements that could be made to both routes as they operate along their existing alignments:

- Provide additional evening service on Route 35
- Adjust the amount of service provided between the two routes to better balance loads
- Coordinate Route 35 and 36 service along Centre Street and Belgrade Avenue
- Provide additional Route 36 service to the VA Hospital
- Improve coordination with commuter rail

#### Additional Evening Service on Route 35

On Route 35, service ends at 9:05 pm, while on Route 36, service continues until 1:05 am. The Route 36 service between 9:05 pm and 1:05 am operates at 30 minute headways to accommodate ridership levels between Forest Hills and the Centre Street business district. Late evening ridership on Route 36 along Spring Street beyond the Centre Street business district is very low, at only 29 trips after 9:05 pm. Therefore, 30 minute headways are not needed along that segment.

Instead of continuing to provide more service than is needed along the outer end of Route 36, half of the Route 36 trips could be replaced with Route 35 trips. This would shift underutilized service to an area that currently has no late evening service, thereby expanding evening service coverage and utilizing resources more effectively. Thirty minute headways would continue to operate between Forest Hills and the Centre Street business district, so that most riders would be unaffected. This change would result in a net gain of approximately 20 trips: a gain of 30 on Route 35, partially offset by a loss of 10 trips on Route 36. There would be essentially no cost associated with this change, since the same number of vehicles and vehicle hours would be involved.

#### Allocation of Service between Route 35 and Route 36

As of the Winter of 1988, 84 daily trips were operated on Route 35 and 133 daily trips were operated on Route 36. Much of this difference was due to the longer span of evening service on Route 36, but with the exception of the school period, more service is provided on Route 36 than on Route 35 during other periods as well.

The higher level of service on Route 36 is not justified by ridership levels. Total Route 36 ridership is higher than on Route 35, but the difference is due to the higher level of service provided by Route 36 on the trunk portion of the route and the longer evening service. On the outer ends of the two routes, beyond the intersection of Spring and Centre Streets, ridership is higher on Route 35. In the Spring of 1986, outer end ridership was 1,590 trips per day on Route 35 versus 1,300 on Route 36. Further, based on the ridership increases indicated by the pointchecks, this difference has since increased to 2,065 on Route 35 and 1,495 on Route 36.

Route 35's lower service level and higher outer end ridership results in higher peak loads on Route 35 than on Route 36 for much of the day (see Table 9-5). Further, although crowding is not a problem on either route for most of the day, there is some crowding during the peak half-hour on Route 35 during both peak periods, but not on Route 36.

---

**Table 9-5**  
**Routes 35 and 36: Fall 1987 Peak Loads<sup>39</sup>**  
**(all variations)**

	<u>Early AM</u>	<u>AM Peak</u>	<u>Base</u>	<u>School</u>	<u>PM Peak</u>	<u>Evening</u>
<u>Total Period</u>						
Route 35	45	40	34	47	31	27
Route 36	32	32	25	32	23	19
<u>Peak Half-Hour</u>						
Route 35		62			50	
Route 36		44			36	

---

In addition to pointing out the need for additional peak half-hour service on Route 35 in the AM peak (see "LEVEL OF SERVICE" Section), these figures also indicate that some Route 36 service should be shifted to Route 35 to better equalize loads between the two routes. This could be accomplished in conjunction with coordinating service on the two routes to provide consistent headways between Route 35 and Route 36 trips. At present, there is no schedule coordination between the two routes except between three trips in the early morning. Trunk headways range from one to 12 minutes in the AM peak and from four to ten minutes in the PM peak. During off-peak periods, some Route 35 and 36 trips depart from Forest Hills at the same time.

---

<sup>39</sup>Route 35 peak loads include a 30 percent increase over observed Spring 1986 peak loads; Route 36 peak load figures include a 15 percent increase.

To fully coordinate service, enough service should be shifted from Route 36 to Route 35 to provide the same level of service on each route. This would help to equalize loads, although Route 35 loads would continue to be approximately 18 percent higher due to higher outer end ridership. However, this difference would be significantly lower than existing conditions where Route 35 loads are 25 to 47 percent higher than on Route 36. Alternatively, a higher level of service could be provided on Route 35 than on Route 36 to equalize *average* peak loads between the two routes, but the resulting uneven headways would cause uneven loading between successive trips. These loading differences would likely exceed the 18 percent difference resulting from coordinated service.

### Coordinated Service

At present, eight buses are deployed on Routes 35 and 36 during the AM peak, four during the mid-day, 11 in the PM peak, and four during the evening. As shown in Table 9-6, vehicle deployments are higher on Route 36 during peak periods and in the evening, the same on the two routes during the base period, and higher on Route 35 during the school period. Further, although running times are shorter on Route 35 due to a slightly shorter alignment, the same effective cycle time (an average of 60 minutes) is used on both routes throughout most of the day.

---

**Table 9-6**  
**Routes 35 and 36: Spring 1987 Vehicle Deployment and Headways**

	Early <u>AM</u>	AM <u>Peak</u>	<u>Base</u>	<u>School</u>	PM <u>Peak</u>	<u>Evening</u>
<u>Route 35</u>						
Vehicles Deployed	3	3	2	4	6	1
Average Headways (min)	20	20	30	15	12	60
Cycle Time (min)	60	60	60	60	72	60
<u>Route 36</u>						
Vehicles Deployed	3	5	2	2	5	2
Average Headways (min)	20	12	30	30	14	30
Cycle Time (min)	60	60	60	60	70	60

---

The ridechecks performed in the Spring of 1986 show that the Route 35 cycle times remain appropriate. Route 36 cycle times could be shortened, but to coordinate service, they should remain as they are. The changes needed to fully coordinate service throughout the day are as follows:

**Early Morning** During the early morning, the one inbound Route 35.0 trip is already coordinated with Route 36 service; no changes are needed.



**AM Peak** During the AM peak, three vehicles are deployed on Route 35 and five vehicles are deployed on Route 36. Headways are 20 minutes on Route 35 and 12 minutes on Route 36. Service is not coordinated. To coordinate service, one vehicle should be shifted from Route 36 to Route 35. This would allow 15 minute headways to be provided on each route, with schedules set to provide 7.5 minute headways on the trunk.

**Base** During the base period, vehicle deployment and headways are already set at levels in which service can be coordinated, although it is not. Both routes have two vehicles deployed and operate at 30 minute headways. Intervals between departures from Forest Hills alternate between 10 and 20 minutes, with Route 35 trips leaving at 10 and 40 minutes past the hour, and Route 36 trips leaving on the hour and 30 minutes past the hour. Arrivals alternate at 13 and 17 minute intervals - Route 35 trips arrive approximately two and 32 minutes past the hour and Route 36 trips arrive approximately 19 and 49 minutes after the hour. To coordinate service, Route 35 trips should leave five minutes later from Forest Hills and depart from the Dedham Mall two minutes later. Based on observed outbound running times, the three fewer minutes of layover time that would be provided at the Dedham Mall under this scenario would not affect reliability.

**School** In the school period, a higher level of service is now provided on Route 35 than on Route 36, although Route 36 serves two high schools (Catholic Memorial and Roxbury Latin), while Route 35 only serves one (Roxbury Latin). Total ridership is higher on Route 35, mostly due to the higher level of service on Centre and Belgrade Streets. Four vehicles are deployed on Route 35 providing 15 minute headways and two vehicles are deployed on Route 36 providing 30 minute headways. Service is currently not coordinated, and all outbound Route 36 trips depart from Forest Hills at the same time as a Route 35 trip. To coordinate service, which would reduce effective headways from 15 minutes to 10 minutes, one vehicle should be shifted from Route 35 to Route 36 to deploy three vehicles on both routes. This would allow 20 minute headways to be provided on each route, and 10 minute headways on the trunk, increasing ridership by up to 195 trips per day.

**PM Peak** In the PM peak, six vehicles are deployed on Route 35 and five vehicles are deployed on Route 36. Headways on Route 35 average 13 minutes, and headways on Route 36 average 14 minutes. Service is not coordinated, and outbound headways range from five to ten minutes. Further, with the exception of two trips in the peak half-hour, nearly all trips are well below capacity. Therefore, in addition to coordinating service, it would also be possible to reduce service levels. As further discussed in the "LEVEL OF SERVICE" section below, vehicle deployment

could be reduced from eleven vehicles to eight vehicles, with four deployed on each route. Using a 72 minute cycle time, 18 minute headways could be provided on each route, with nine minute headways on the trunk.

**Evening** During the evening, Route 35 operates only until 9:05 pm while Route 36 continues to operate until 1:05 am. As discussed previously, better service coverage could be provided by using the same vehicles to provide evening service on both routes at 60 minute headways. Thirty minute headways would be provided on the trunk segment of the routes.

These changes are summarized in Table 9-7.

**Table 9-7**  
**Routes 35 & 36: Revised Schedule Statistics with Coordinated Service**

	Early <u>AM</u>	AM <u>Peak</u>	<u>Base</u>	<u>School</u>	PM <u>Peak</u>	<u>Evening</u>
<u>Headways (min)</u>						
<u>Existing</u>						
Route 35	1T	20	30	15	13	58
Route 36	1T	10	28	24	14	29
Combined Trunk Headway	--	7	29	15	7	19
<u>w/ Coordinated Service</u>						
Route 35	1T	15	30	20	18	60
Route 36	1T	15	30	20	18	60
Combined Trunk Headway	--	7.5	30	10	9	30
<u>Vehicle Requirements</u>						
<u>Existing</u>						
Route 35	1	3	2	4	6	1
Route 36	1	5	2	2	5	2
Total	2	8	4	6	11	3
<u>w/ Coordinated Service</u>						
Route 35	1	4	2	3	4	1
Route 36	1	4	2	3	4	1
Combined Trunk Headway	2	8	4	6	8	2

#### Additional Service to the VA Hospital

Currently, slightly over 40 percent of Route 36 service operates to and from the VA Hospital in West Roxbury (as variation 36.8), although the percentage varies by time of day. One-third of all trips operate there in the AM peak, and one-half in the PM peak. During the base and school periods, nearly all trips operate to the VA Hospital. In the evening, the last trip leaves the hospital at

7:20 pm. After that time, all service operates from the Charles River Loop (as variation 36.0).

Most Route 36 trips do not operate to the VA Hospital because of relatively low ridership (95 trips per day in the Spring of 1986), and so that buses can be recycled faster. However, with Route 35 and 36 service coordinated as described above, both routes would be scheduled using the same cycle time during all periods (72 minutes in the PM peak and 60 minutes during all other time periods). These cycle times are based on the running time and layover time requirements of Routes 35.0 and 35.1, which are longer than Route 36. This would leave enough slack time within Route 36 cycle times to operate all trips to and from the VA Hospital as Route 36.8 trips. A large amount of additional ridership would not be expected, but hospital employees and visitors would be better served. By providing service to the hospital until approximately 1:00 am, employees working both second and third shifts would be served, and service would be provided to evening visitors. The additional service could be provided at essentially no cost since no additional vehicles or vehicle time would be involved.

### Improved Coordination with Commuter Rail

Connections can be made between Routes 36 and commuter rail at all four stations in West Roxbury and Roslindale: West Roxbury, Highland, Bellevue and Roslindale Village. On Route 35, connections can be made at all stations except the West Roxbury Station. However, direct service on either route is possible only at the Bellevue and Roslindale Village stations. Access to the West Roxbury and Highland stations, which would be most convenient for most potential commuter rail transfers, requires a walk of about one block. Due to the location of these two stations, and the alignment of Routes 35 and 36 along Centre Street, more direct access is not possible. Therefore, most connections would be expected to be made at the Bellevue station, the first station at which direct connections could be made.

Overall, improved connections with commuter rail would be dependent upon a revised commuter rail schedule with trains operating at regular headways. Until that time, Route 35 and 36 service could not meet all trains without operating those routes at inconsistent headways, which would likely inconvenience more riders transferring from the Orange Line than would benefit from commuter rail. However, some marginal improvements could be made:

Peak Period Connections The largest obstacle to peak period coordination between Routes 35 and 36 and commuter rail is the irregular commuter rail schedule. During the AM peak, five inbound trains operate at uneven headways of 41, 45, 35 and 50 minutes; during the PM peak, headways between the five outbound trains are 35, 40, 40 and 35 minutes. To



coordinate with these schedules would require that bus service also operate at uneven headways. Although data on commuter rail transfers is not available, it is likely that the wait time savings to commuter rail transfers would be outweighed by additional wait time experienced by other bus riders due to uneven headways.

If peak period commuter rail service is improved to provide 30 minute headways, it would be possible to coordinate all commuter trips with Route 35 or 36 trips. However, only Route 35 or Route 36 could be coordinated since the two routes would alternate trips at 7.5 minute intervals. Therefore, each commuter rail trip would always meet either a Route 35 trip or a Route 36 trip. Transfers with the other route would require a wait of approximately nine to eleven minutes. No commuter rail transfer information is currently available to indicate which bus connection would be better.

**Mid-day Connections** Between the end of the AM peak and the start of the PM peak, service operates at either one or two hour headways. All of these trips operate at clock headways so that they could be coordinated with bus service. However, with coordinated service between Routes 35 and 36, only Route 35 or 36 could be coordinated with commuter rail. Again, there is no data as to which route would make a better connection. Further, either route could only be scheduled for close connections in one direction. For example, a Route 35.1 trip leaving Forest Hills at 12:15 pm would arrive at Bellevue at 12:26 pm, only three minutes after the train at 12:23 pm. However, the returning inbound trip departing from the Dedham Mall at 12:45 pm would arrive at Bellevue at 12:56 pm, 11 minutes before the 1:07 inbound train.

This would leave two options for coordinating service: either close connections could be made in one direction only, or an equal seven minute transfer time could be scheduled in both directions. On both routes, base period ridership is higher in the inbound direction than in the outbound direction throughout the period. Therefore, total passenger wait time would be minimized by opting for close inbound connections.

**Evening Connections** As with peak period service, evening service also operates at uneven headways. The four outbound trains, which are the more heavily utilized, depart at intervals of 90, 65, and 80 minutes. With Route 35 and 36 operating at 60 minute headways, improved connections could be made with only two of four trains.

Lastly, even without schedule changes to improve coordination between Routes 35 and 36, some good connections will naturally occur. This is especially true during peak periods, where if Routes 35 and 36 are coordinated, short headways would be provided and good connections should

be possible at certain stations. However, because bus schedules do not give scheduled times at any of the commuter rail stations, it is extremely difficult for potential riders to know when this would be the case. Where good connections are possible, they should be noted on both commuter rail and bus schedules to facilitate transfer trips.

### LEVEL OF SERVICE

As discussed under the "Improved Coordination" section, Routes 35 and 36 would be operated most effectively if they were run with the same level of service and with coordinated schedules. This would require operating the same number of vehicles on each route. In most cases, this would mean continuing to operate the same total number of vehicles, but redistributing them between the two routes. Service cuts could also be implemented in conjunction with coordinating the two routes but, as discussed below, this would likely create crowding problems in all periods except the PM peak.

**AM Peak** Eight vehicles are now deployed on Routes 35 and 36. With the same level of service on each, four vehicles would be deployed on each route providing 15 minute headways (7.5 minutes on the trunk). This would result in average peak loads for the period of 38 on Route 35, and 32 on Route 36. The peak half-hour peak load (between 7:24 am and 7:54 am) would average 47, but with certain trips up to 65. Average loads for the period and the peak half-hour would be within MBTA crowding standards, as well as provide improvements over Spring 1986 average peak loads of 40 on Route 35 and up to 70 on individual trips (and presumably even higher loads since the opening of the new Orange Line).

Operation of three vehicles on each route (which would mean taking two vehicles off of Route 36), would result in 20 minute headways on each route and 10 minute headways on the trunk. This would save 8.1 hours of vehicle time, but result in a loss of approximately 230 riders on Route 36 and on the trunk segment of Routes 35 and 37. It would also create some crowding problems, but average loads would still be within standard for the period as a whole at 48 on Route 35 and 40 on Route 36. During the peak half-hour, loads would average 63 and exceed 70 on two trips. These loads would exceed crowding standards and require two additional trips during the peak half hour, which would reduce vehicle hour savings to 6.1 hours. Annual operating cost savings would be \$19,100 per year. However, the fare revenue loss would exceed savings at \$20,000 per year, resulting in an increase in the operating deficit of \$600 per year.

**Base Period** During the base period, two vehicles are deployed on each route to provide 30 minute headways. With coordinated service, these headways would result in average peak loads of 32 on Route 35 and 27 on

Route 36. To save one vehicle on each route would require that headways be doubled to 60 minutes. This would result in a loss of 360 riders, and increase average peak loads to 48 on Route 35, and 40 on Route 36. It would also increase wait time for remaining passengers by 131 hours, or 12.5 hours for each of the 10.5 hours of vehicle time that would be saved.

**School Period** In the school period, six vehicles are deployed. At present, 15 minute headways are provided on Route 35 and 30 minute headways are provided on Route 36. As previously mentioned, service is not coordinated and most Route 36 trips depart from Forest Hills at the same time as a Route 35 trip. This scheduling results in effective headways on the trunk of 15 minutes. With coordinated service, three vehicles would be deployed on each route to provide 20 minute headways, reducing effective headways on the trunk to 10 minutes. This would increase ridership by 195 trips per day and reduce passenger wait time by 40 hours per weekday.

To save one vehicle on each route would require that both routes be operated at 30 minute headways. With coordinated service, this would result in the same 15 minute effective headways on the trunk as are now operated. However, since two fewer buses would be operated, fewer seats would be provided. Service is already fairly heavily utilized during this period, and the operation of two fewer vehicles would increase average peak loads to 67 on Route 35 and 56 on Route 36, well above capacity and loading standards.

**PM Peak** During the PM peak, eleven vehicles are now operated, providing average headways of 13 minutes on Route 35 and 14 minutes on Route 36. Average headways on the trunk are six to seven minutes. The Route 35 level of service is higher than that provided in the AM peak and not justified by ridership: peak loads average 31 on Route 35 and 23 on Route 36, although some peak half hour crowding does occur. Therefore, less service could be operated throughout most of the period.

To fully coordinate service on the two routes, the same number of vehicles would have to be operated on each route, which would allow for a savings of one, three, or five vehicles. To save three vehicles, four vehicles would be operated on each route. With a cycle time of 72 minutes, 18 minute headways would be operated on each route, and nine minutes on the trunk. The higher headways would result in a loss of 80 trips, but would save six vehicle hours. Peak loads would average 40 on Route 35 and 34 on Route 36. Also, with coordinated service, schedules could be set so that loads during the peak half hour would be no higher than 55, less than 140 percent of seated capacity. Passenger wait time would only increase by 3.7 hours for each vehicle hour saved. This scheduling would reduce operating costs by \$56,300 per year.



To save five vehicles, three vehicles would be operated on each route, providing 24 minute headways on each route and 12 minutes on the trunk. These headways would result in a loss of 130 trips, and increase average peak loads to 51 on Route 35 and 43 on Route 36. The peak load of 51 on Route 35 would translate into a load factor of 128 percent of seated capacity, which would exceed loading standards. Peak half-hour loads would also exceed loading standards, averaging 63 between 4:35 pm and 5:05 pm, or 158 percent of seated capacity. Ten vehicle hours would be saved, and passenger wait time would be increased by 42 hours, or 4.2 hours for each vehicle hour saved. Annual operating cost savings would be \$87,000.

**Evening** During the evening, if service is operated on both routes as discussed above, one vehicle would operate on each route throughout the period. Headways on each route would be 60 minutes, coordinated to provide 30 minute headways on the trunk. Peak loads would average 22 on Route 35 and 18 on Route 36.

A summary of the levels of service required required to coordinate service and to best match service levels to ridership (based on MBTA loading standards), based on the above, is shown in Table 9-8.

---

**Table 9-8**  
**Routes 35 and 36: Recommended Service Levels**

	Early AM	AM Peak	Base	School	PM Peak	Evening
<u>Route 35</u>						
Headways (min)	20	15	30	20	18	60
Vehicles Required	3	4	2	3	4	1
Cycle Time (min)	60	60	60	60	72	60
<u>Route 36</u>						
Headways (min)	20	15	30	20	18	60
Vehicles Required	3	4	2	3	4	1
Cycle Time (min)	60	60	60	60	72	60
<u>Combined</u>						
Headways (min)	10	7.5	15	10	9	30
Vehicles Required	3	8	4	6	8	2
<i>Vehicle Savings</i>	0	0	0	0	3	0

---

## RELIABILITY

### Route 35

On Route 35, a number of off-schedule departures were observed throughout the day (see Table 9-9). The causes for these off-schedule departures could not be determined from the ridecheck data. In general, most early departures were in the inbound direction, and most late departures were in the outbound direction, which would often indicate the need for more layover time between the inbound and outbound trips (in this case at Forest Hills). However, average inbound running times were within two minutes of scheduled times, and no inbound trips were observed arriving at Forest Hills late. During all periods, cycle times are adequate to maintain better than 90 percent on-time performance.<sup>40</sup>

---

Table 9-9  
Route 35: On-Time Departure Performance  
(All Variations)

	Early <u>AM</u>	AM <u>Peak</u>	<u>Base</u>	<u>School</u>	PM <u>Peak</u>	<u>Evening</u>
3-5 Minutes Late	33%	6%	14%	0%	0%	0%
> 5 Minutes Late	0%	12%	5%	0%	0%	0%
> 2 Minutes Early	0%	0%	10%	20%	11%	0%
On Time	67%	82%	71%	80%	89%	100%

---

### Route 36

On Route 36, a large number of early departures were observed in the inbound direction on variation 36.8, which operates to the VA Hospital (see Table 9-10). The apparent cause of these early departures is drivers leaving the outer terminal early in order to arrive at Forest Hills in time to avoid late departures on the subsequent outbound trip; all but one of the early departures were in the inbound direction, and observed inbound running times exceeded scheduled by an average of two to five minutes, depending on the time of day.

On a round trip basis, existing cycle times are sufficient to maintain better than 90 percent on-time performance. Average running times exceed schedule times by no more than two minutes, and total round trip running

---

<sup>40</sup>For detailed running time information by period and direction, see Technical Supplement 2.

times plus recovery time range from 45 to 55 minutes, well within scheduled 60 to 70 minute cycle times. Therefore, existing off-schedule departure problems could be solved by increasing inbound running times and recovery times at Forest Hills, so that scheduled times reflect actual conditions, as shown in Table 9-11.

**Table 9-10**  
**Route 36: On-Time Departure Performance**

	Early <u>AM</u>	AM <u>Peak</u>	<u>Base</u>	<u>School</u>	PM <u>Peak</u>	<u>Evening</u>
<u>Route 36.0</u>						
3-5 Minutes Late	10%	0%	0%	--	0%	0%
> 5 Minutes Late	0%	0%	0%	--	0%	0%
> 2 Minutes Early	0%	0%	0%	--	0%	0%
On Time	90%	100%	100%	--	100%	100%
<u>Route 36.8</u>						
3-5 Minutes Late	--	0%	5%	0%	0%	0%
> 5 Minutes Late	--	0%	0%	0%	0%	0%
> 2 Minutes Early	--	30%	25%	25%	10%	20%
On Time	--	70%	70%	75%	90%	80%

**Table 9-11**  
**Route 36.8 Observed Schedule Statistics**  
**(In Minutes)**

	<u>7:00am- 8:59am</u>	<u>9:00am- 1:59pm</u>	<u>2:00pm- 5:59pm</u>	<u>6:00pm- 8:29pm</u>
<u>Inbound</u>				
Observed Run Time	27	25	24	18
Required Layover Time	5	5	4	3
<u>Outbound</u>				
Observed Run Time	21	21	23	20
Required Layover Time	2	3	2	4
<u>Round Trip</u>				
Obs Round Trip Run Time	48	46	47	38
Required Layover Time	7	8	6	7





---

## 10. Route 37

---

*Route 37: Baker & Vermont Streets - Forest Hills*

### ROUTE PROFILE

Route 37 operates between the intersection of Baker and Vermont Streets in West Roxbury and Forest Hills via Bellevue and Roslindale Square (see Figure 10-1. There are two variations of Route 37, as listed below:

37.0 Baker and Vermont Streets - Forest Hills

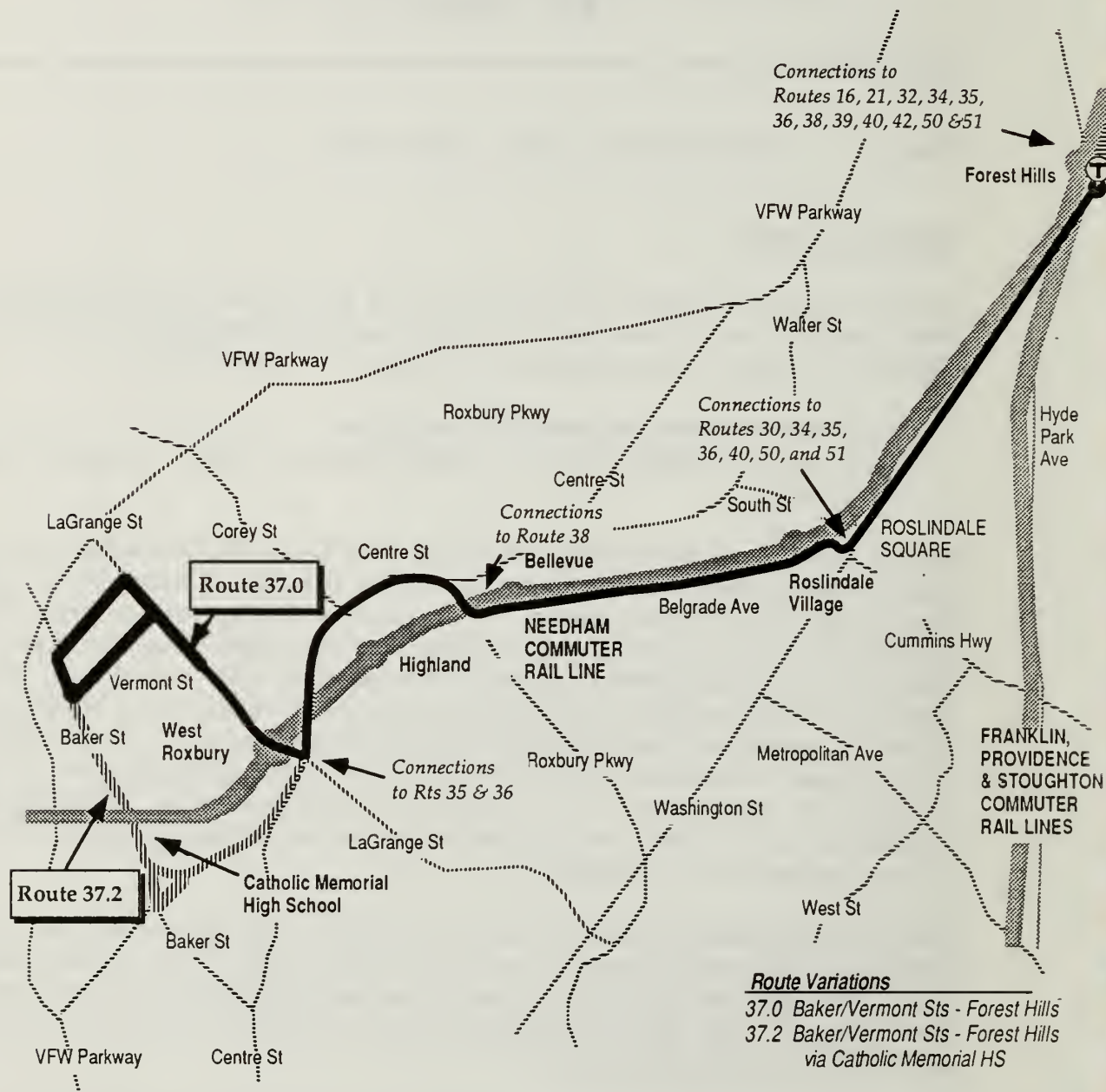
37.2 Baker and Vermont Streets - Forest Hills via Catholic Memorial High School

Nearly all service is operated as Route 37.0, with Route 37.2 comprised of only two AM peak outbound trips daily. The major function of Route 37, as with most other Forest Hills routes, is to provide feeder service from the residential area at the end of the line near Vermont Street to and from Forest Hills. The route also serves a significant number of trips to and from West Roxbury's business district along Centre Street and to and from Roslindale Square. Connections can be made from Route 37 to Routes 35, 36, and 38 on Centre Street; to Routes 30, 34, 40, 50, and 51 at Roslindale Square; and to the Orange Line and Routes 16, 21, 39, and 42 at Forest Hills. In addition, connections can be made with commuter rail at the Bellevue and Roslindale Village stations on the Needham Line.

Service is provided between 5:30 am and 7:45 pm, with 20 minute headways during the AM peak, 30 minute headways mid-day and 13 minute headways in the PM peak (see Table 10-1). Some minor rescheduling has occurred since the Spring of 1986, but the changes do not affect the amount of service provided or average headways.

In the Spring of 1986, total ridership on Route 37 was 1,785 trips per day. However, as with other Forest Hills routes, more recent pointchecks indicate that the opening of the new Orange Line has increased ridership to and from Forest Hills by approximately 30 percent through the Fall of 1987. This increase of 385 passengers results in a 22 percent increase in total ridership to approximately 2,170 trips per day (see Table 10-2). With the exception of inbound AM peak trips between 6:55 am and 8:15 am, adequate capacity exists

**Figure 10-1**  
**Route 37: Baker/Vermont Streets - Forest Hills**



on the route to accommodate these increases. For AM peak inbound trips between 6:55 am and 8:15 am, average peak loads have increased approximately 16 percent to 59 passengers, or 148 percent of the seated capacity of the non-accessible RTS II buses.



**Table 10-1**  
**Route 37 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1987): 5:30 am - 7:45 pm

	Average One-Way Length	One- Way Trips	Avg Headway (Min-Peak Dir)						All Day	
			EA	AM	Base	Sch	PM	Eve	VSM	VSH
<i>Spring 1986</i>										
Rt 37.0	4.4	78	1T	20	30	22	13	4T	339.3	39.8
Rt 37.2	4.9	<u>2</u>	<u>--</u>	<u>2T</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>9.8</u>	<u>1.0</u>
<b>Total/Avg</b>		<b>80</b>	<b>1T</b>	<b>20</b>	<b>30</b>	<b>30</b>	<b>13</b>	<b>4T</b>	<b>349.1</b>	<b>40.8</b>

*Spring 1986*

No significant changes have occurred.

**Table 10-2**  
**Route 37 Ridership and Productivity Statistics**

	Weekday Boardings	Boardings/VSM							Boardings/ VSH All Day
		Early AM	AM Peak	Base	Sch	PM Peak	Eve	All Day	
<i>Spring 1986</i>									
Rt 37.0	1,740	2.5	6.6	5.7	5.1	4.9	3.1	5.1	43.7
Rt 37.2	<u>45</u>	<u>--</u>	<u>4.5</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>--</u>	<u>4.5</u>	<u>44.0</u>
<b>Total/Avg</b>	<b>1,785</b>	<b>2.5</b>	<b>6.3</b>	<b>5.7</b>	<b>5.1</b>	<b>4.9</b>	<b>3.1</b>	<b>5.1</b>	<b>43.8</b>

*Spring 1986*

**Total/Avg 2,170 6.2 53.1**

*Change* +22% +22% +21%

Percent of passengers 65 or older (Spring 1986): 13.0%

Percent without a car available for trip (Spring 1986): 66.2%

Spring 1986 peak load points: Inbound: Washington St. @ Aldwin Road  
Outbound: Washington St. at Archdale Road

On Route 37, as with Routes 35 and 36, most riders are from West Roxbury or Roslindale. In the Spring of 1986, for home-based trips, 57 percent of all riders were from West Roxbury and 28 percent from Roslindale. Fifty-one percent of work and school trips were to downtown Boston, 20 percent were to West

Roxbury, and 11 percent were to Roxbury. These ridership patterns result in highly directional ridership. During the AM peak, 89 percent of all trips were inbound towards Forest Hills. In the PM peak, including the impact of reverse direction shopping trips, 69 percent were outbound.

With the large number of trips destined towards Forest Hills and downtown Boston, there is a large degree of transferring among Route 37 riders. Seventy-four percent of all trips included a bus or rapid transit transfer in the Spring of 1986; with increased ridership to Forest Hills since then, this figure has increased to up to 80 percent. Assuming that the number of riders that walk at both ends of their trip has stayed essentially the same between the Spring of 1986 and Fall of 1987, the percentage of bus transfers has declined from 24 percent to 20 percent.

Of the trips that involve transfers, most are to and from the Orange Line. In the Spring of 1986, 850 transfers were made per day with the Orange Line, accounting for 48 percent of the route's ridership. With the increase to and from Forest Hills through the Fall of 1987, transfers to and from the Orange Line have increased to up to 1,340, or 59 percent of the route's ridership. Most bus transfers are made with Route 39 (295 per day in Spring 1986, or 17 percent of total ridership), followed by Route 36 (45 per day), Routes 30 and 32 (30 each), Route 16 (25), Route 50 (15), and Routes 34 and 38 (10 each).

The level of transit dependency of Route 37 riders is below average for the WESTBus corridor. While nearly average numbers of riders are under 18 (15 percent) or over 65 or older (13 percent), only 66 percent did not have a car available for their trip and only 26 percent had annual household incomes of \$15,000 or less. These figures compare to corridor averages of 74 percent and 37 percent, respectively.

## SERVICE COVERAGE

### Overall Assessment

In areas served by Route 37, the largest concentrations of work trips are made to downtown Boston. Of a total of 11,350 work trips made by residents of West Roxbury and Roslindale from the area served by Route 37 in 1980, 2,325 were made to and from the Financial District, Government Center, Park Square or the Back Bay. Many fewer trips were made within the local area: 360 daily trips were made to and from West Roxbury and only 90 to and from Roslindale.

As discussed in Chapter 7, during the BTB's transportation workshops, residents of West Roxbury expressed a desire for better service for those trips within West Roxbury (primarily from residential areas to the Centre Street

business district). These residents also want better bus connections and coordination with commuter rail. Route 37 is one route that already provides good service from one specific residential area (around Baker and Vermont Streets) to the Centre Street business district. It also provides direct connections with commuter rail at the West Roxbury station, although connections between the two services are not coordinated.

With the exception of the outer segment between Baker/Vermont Streets and Centre Street, Route 37's alignment is also served by Routes 35 and 36. Further, most ridership on Route 37 is exclusively on the section also served by those two other routes (1,160 of 1,785 trips in the Spring of 1986), and most ridership on the outer end is to Forest Hills (365 of 555). Therefore, it would be possible to reroute the inner segment of the route (between LaGrange and Centre Streets and Forest Hills) along another alignment to provide new service, rather than duplicating Route 35 and 36 service, without disrupting most existing travel patterns. As long as the route continued to serve the West Roxbury commuter rail station, commuter rail transfer opportunities would also be increased.

### **Realignment of Route 37**

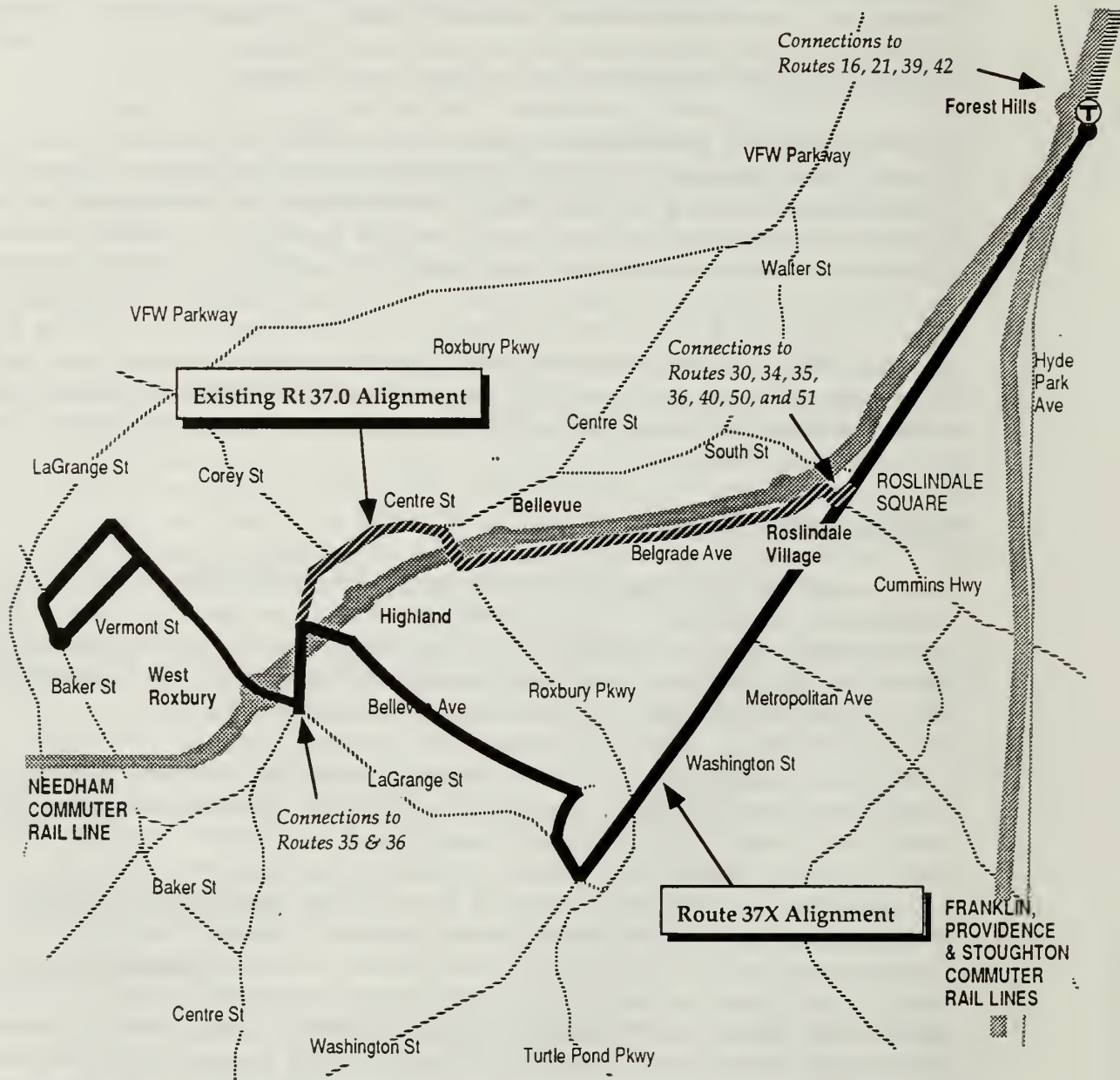
So as to not leave existing trips unserved or with less convenient service, any realignment of Route 37 would need to continue to primarily serve trips between the vicinity of Baker and Vermont Streets, including LaGrange Street, the Centre Street business district and Forest Hills. In addition, the West Roxbury commuter rail station should continue to be served.

To achieve this, outer end service along LaGrange, Vermont, Baker, and Lasell Streets should remain essentially unchanged. Further, between Centre Street and Forest Hills, the route would need to be direct enough so that travel times to Forest Hills would not change significantly. This could be accomplished by operating Route 37 from Centre and LaGrange Streets to Washington Street via Bellevue Avenue instead of along Centre Street and Belgrade Avenue (see Figure 10-2). The distance would be slightly longer, but travel times should be roughly equivalent because operating speeds should be faster since there would be less traffic congestion along that alignment. (Alternatively, similar service could be provided by operating the route between Centre Street and Washington Street straight along LaGrange Street. This would provide better service coverage in the Bellevue area, but would miss most of the Centre Street business district.)

The Bellevue Street alignment (for these purposes called Route 37X) would provide improved service coverage in West Roxbury for local trips and trips to Forest Hills and downtown Boston. Local service coverage would be expanded by linking the Bellevue area with the Centre Street



**Figure 10-2**  
**Route 37X: Baker & Vermont Streets - Forest Hills via Bellevue**



business district and by providing "crosstown" service between the Bellevue area and the area north of Centre Street. Service to Forest Hills would be improved by expanding coverage to parts of the Bellevue area that are not now directly served, and by providing more direct service in sections that are served (by Route 38).

### Ridership Impacts

Based on observed travel patterns on Route 37, the Route 37X alignment would not leave any existing riders unserved or require any new transfers. All riders that board along LaGrange, Lasell, Baker, and Vermont Streets travel to and from the Centre Street business district, Roslindale Square, Washington Street, or Forest Hills. None of the surveyed riders from this area made any trips to Centre Street or Belgrade Avenue between the Centre Street business district and Roslindale Square. Therefore, the riders from the outer segment would be able to continue to make all of the existing 670 daily trips.<sup>41</sup> Not all of the Centre Street business district would be directly served as it now is (since the route would turn down Bellevue Street), but all of it would be within one-quarter mile walking distance.

Most Route 37 riders use only the segment of the route between Forest Hills and LaGrange Street (1,505 of 2,170 daily trips). These trips would not be served by Route 37X, but would continue to be served by Routes 35 and 36. However, the combined level of service provided along Centre Street and Belgrade Avenue by Routes 35, 36, and 37 would decline if Route 37 were moved to the Route 37X alignment. Riders traveling only along the common segment of these routes should show no preference among the three routes and normally board the first Route 35, 36 or 37 trip to arrive at their stop. Therefore, the Route 37X change would also impact many Route 35 and 36 riders as well. As shown in Table 10-3, combined headway increases would be relatively small, but would nonetheless be expected to result in a loss of 395 daily trips, or 8.5 percent of the 4,640 daily Route 35, 36 and 37 riders that only utilize trunk service.

---

**Table 10-3**  
**Impact of Route 37X Realignment on Route 35, 36 and 37 Trunk Riders**  
**(Based on Fall 1987 Service and Ridership Levels)**

	AM			PM		All
	<u>Peak</u>	<u>Base</u>	<u>School</u>	<u>Peak</u>	<u>Evening</u>	<u>Day</u>
Rt 35, 36 & 37 Combined Hdwys (min)	5	10	9	4	30	
Rt 35 & 36 Combined Hdwys (min)	7	14	11	7	30	
Rt 35, 36 & 37 Trunk Ridership	1,385	1,235	675	880	465	4,640
Est Trunk Ridership w/o Rt 37	1,295	1,060	645	780	465	4,245
Ridership Loss on Trunk	90	175	30	100	0	395
Percent Loss	7%	14%	4%	11%	0%	9%

---

<sup>41</sup>Estimates based on estimated Spring 1987 ridership levels.

New service would be provided between Centre Street and Washington Street along Bellevue Avenue, which would increase the size of Route 37's work trip market by 240 trips per day. Some of this area is already served by Route 38, but much is currently unserved. Based on market penetration of the existing route, including non-work trips, and assuming the same level of service on Route 37X as on Route 37, the larger market would attract 220 new trips per day. Up to 70 of these new trips would be riders shifting from Route 38, since Route 37X would provide faster service to Forest Hills than the existing Route 38.

Along Washington Street between LaGrange Street and Forest Hills, Route 37X would serve the same market as Route 34 and Route 40, carrying local trips along Washington Street and trips to and from Forest Hills. Based on ridership on those routes within the same segment and relative levels of service, Route 37X would be expected to carry 695 (21 percent) of those trips. However, this new service on Washington Street would not allow for corresponding service reductions on Route 34 or Route 40, since most ridership on those routes has one trip end south of LaGrange Street.

Including this ridership along Washington Street, estimated total ridership on Route 37X would be 1,585 trips per day. This would be 585 daily trips (31 percent) lower than the existing route, largely due to the shifting of riders from Route 37 to Routes 35 and 36 (1,505), only partially offset by riders shifting from Routes 34 and 40 along Washington Street (695). Total new ridership<sup>42</sup> attracted by Route 37X would be approximately 150 trips per day, plus an additional 70 trips would be diverted from Route 38. However, this would be more than offset by the ridership loss of 395 existing Route 35/36/37 trips per day along Centre Street and Belgrade Avenue that would result from a lower level of service there if Route 37 were moved to Bellevue Avenue. Therefore, Route 37X would result in a net ridership loss of 245 trips per day.<sup>43</sup>

---

<sup>42</sup>While ridership shifts between Routes 35, 36, 37, 38 and 51 have been identified wherever possible, other ridership identified as "new" also likely includes riders of other transit services that could not be accurately identified that would also shift to the new route. As a general rule, in an area with numerous transit routes such as West Roxbury, up to two-thirds of "new" ridership on any particular route is likely to have shifted from another existing route.

<sup>43</sup>355 trips per day if 25 minute headways were provided in the PM peak, as discussed in the next section.



### Level of Service Impacts

Impact of Ridership Shift to Route 35 and 36 The shift of riders from Route 37 to Routes 35 and 36 would cause some crowding on Routes 35 and 36. On those routes, a shift of 1,505 trips per day would represent a combined ridership increase of 22 percent. If service on Routes 35 and 36 were coordinated at the service levels recommended in Chapter 8,<sup>44</sup> peak loads on Route 35 would average 46 in the AM peak and 49 in the PM peak. The PM peak loads would slightly exceed loading standards, but crowding would be of short duration and not warrant additional service throughout the period. During the peak half-hour, peak loads would average 57 in the AM peak and 56 in the PM peak. However, on specific trips, loads could be as high as 79 in the AM peak (inbound at approximately 7:30 am), and 67 in the PM peak (outbound at approximately 4:45 pm), which would require additional service.

To alleviate the most severe crowding, one trip would need to be added on Route 35 in both peak periods. Assuming both trips would be round trips, the annual cost of this additional service would be \$19,100.

Route 37X As of the Spring of 1987, AM peak trips on Route 37 were heavily loaded, with peak loads averaging up to 45, and peak half-hour loads averaging 68. During other periods, all trips were well below capacity, with the exception of two or three PM peak outbound trips. If Route 37X were implemented, loads throughout the day would decrease 31 percent, as described above. Peak loads in the AM peak would be reduced to an average of 31 for the period as a whole, and to 48 in the peak-half hour (see Table 10-4). During other periods, loads would be well below capacity and loading standards.

Assuming that running times on Route 37X would be essentially the same as they are now on Route 37 and based on observed running times, Route 37X could operate with a 50 minute cycle time throughout the day. This would allow three vehicles to provide 17 minute headways, two vehicles to provide 25 minute headways or one vehicle to provide 50 minute headways.

Based on anticipated ridership levels, 25 minute headways throughout the day would be most appropriate. In the AM peak, 17 minute headways would provide a higher level of service than is now provided for fewer riders, while 50 minute headways would not provide enough capacity. During the mid-day, 50 minute headways would provide enough

---

<sup>44</sup>15 minutes on each route in the AM peak and 18 minutes on each route in the PM peak.

**Table 10-4**  
**Estimated Average Peak Loads on Route 37X**

	Early <u>AM</u>	AM <u>Peak</u>	<u>Base</u>	<u>School</u>	PM <u>Peak</u>	<u>Evening</u>
<i>With Same Headways as Existing Route 37 Service</i>						
Average Headway (min)	20	20	30	30	13	20
Peak Load throughout Period	24	31	17	18	22	29
Peak Half-Hour Peak Load		48			33	
<i>With Increased Headways</i>						
Average Headway (min)	25	25	25	25	25	36
Peak Load throughout Period	27	39	30	33	31	26
Peak Half-Hour Peak Load		54			47	
Vehicle Savings	1	1	0	0	3	0

capacity, but would result in relatively large increases in passenger wait time compared to vehicle savings: 15.2 hours of additional passenger wait time per vehicle hour saved in the base period, and 13.7 in the school period. Alternatively, twenty-five minute headways, which would be slightly lower than current headways, would attract an additional 60 trips per day. In the PM peak, existing 13 minute headways provide more service than is now warranted on Route 37, and with lower ridership, 17 minute headways would provide more service than would be warranted on Route 37X. Twenty-five minute headways would almost double existing headways but be sufficient to handle anticipated loads. The higher headways would result in a loss of 90 trips per day, but 5.8 vehicle hours could be saved at a cost of less than six hours of additional wait time per vehicle hour saved.

The operation of 25 minute headways throughout the day would also save one vehicle in the AM peak and three in the PM peak. This service level would also result in annual operating cost savings of \$40,700.

**Overall Impact** With the ridership changes that would occur on Route 37X due to the level of service changes, Route 37X would carry approximately 1,430 trips per day. Including ridership impacts on other routes, this would represent a loss of 335 trips per day. Including the additional peak half-hour service that would have to be provided on Route 35, annual operating costs would be reduced by \$21,600. These savings would be more than offset by the resulting fare loss of \$28,500 per year, meaning that Route 37X would carry fewer passengers at a higher cost.

### Coordination of Route 37 Service with Routes 35 and 36

As discussed above, most Route 37 riders only use the trunk portion of the route, and presumably don't care whether they use Route 35, 36 or 37. For this reason, if Route 37 continues to operate via Centre Street and Belgrade Avenue, this service should also be coordinated with Routes 35 and 36 to the greatest extent possible. This would be done by operating Route 37 at the same level of service as those routes.

As discussed in Chapter 8, coordinated service on Routes 35 and 36 would operate at 15 minute headways in the AM peak, 30 minutes in the base period, 20 minutes in the school, 18 minutes in the PM peak, and 60 minutes in the evening. As discussed below in the "LEVEL OF SERVICE" section, the most appropriate level of service for Route 37, not considering coordination, would be 16 minutes in the AM peak, 25 minutes in the base period, 25 minutes during the school period, and 17 minutes in the PM peak. There would be no outbound evening service after 7:15 pm, as is now the case. These service levels are similar and could be adjusted so that the three routes could be coordinated.

**AM Peak** To coordinate AM peak service, Route 37 headways would need to be reduced to 15 minutes. This would allow Route 35, 36, and 37 trips to alternate and provide five minute headways on the trunk. To continue to operate three vehicles, an effective cycle time of 45 minutes would be required, while the current route requires a minimum cycle time of 47 minutes to provide reliable service. This could be done in any of three ways: (1) provide the extra time by interlining the route with another that has excess layover time, (2) shorten the route slightly, or (3) operate the route with slightly less layover than would normally be desired.

Of the three approaches, the most preferable would be to provide the extra time by interlining Route 37 with another route.<sup>45</sup> Operating the route with two minutes less layover time to reduce the cycle time to 45 minutes would reduce the total amount of layover time provided by 33 percent from six minutes to four minutes; this would likely adversely impact on-time performance. Route 37 could be shortened to save nearly two minutes round trip by slightly shortening the outer end, but service coverage would be reduced somewhat. However, this would not necessarily result in any ridership losses since the VFW Parkway currently acts as a boundary of Route 37's service area, and a shorter alignment, as

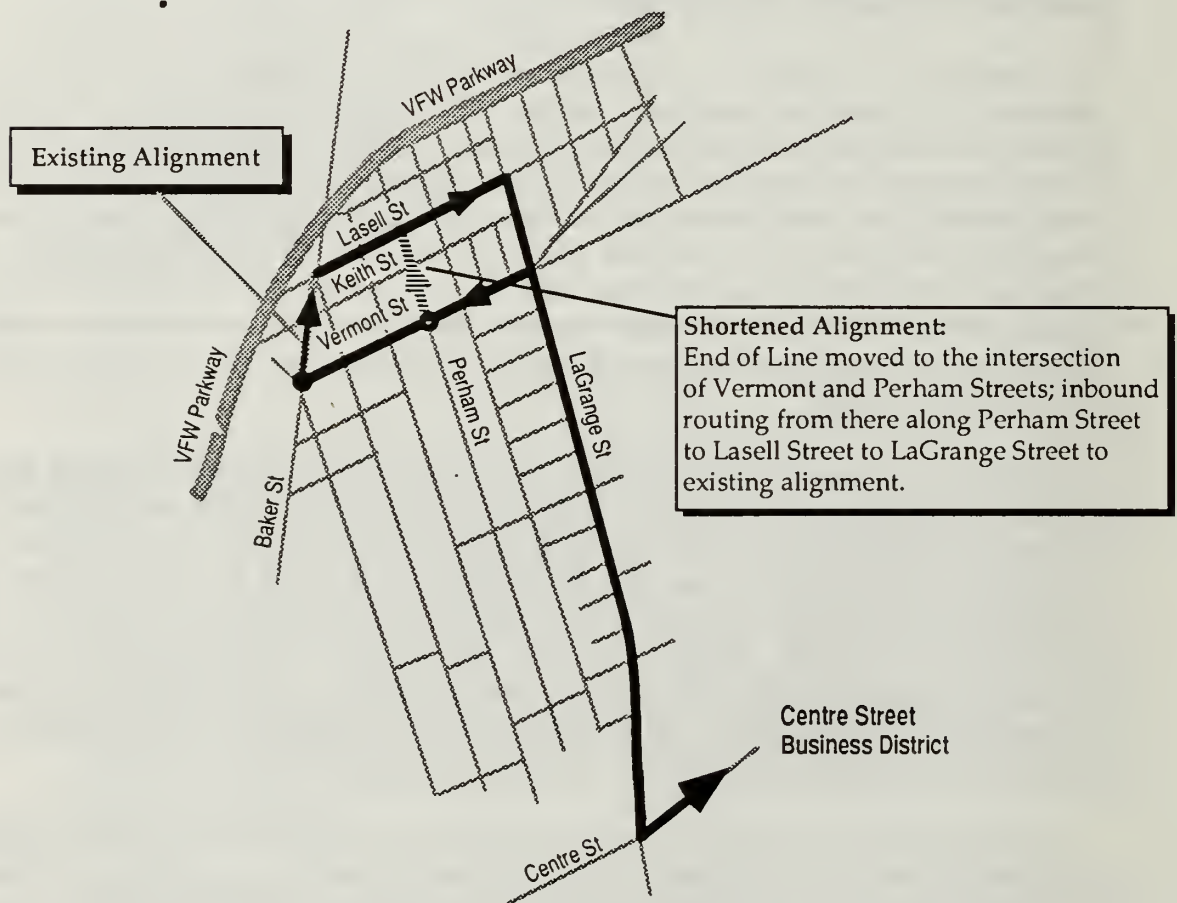
---

<sup>45</sup>Due to the number of variables involved, such as other route changes may also be implemented at the same time, specific interlining possibilities have not been investigated in this analysis.



shown in Figure 10-3, would still be within one-quarter mile of existing riders. Walking distances to the bus would increase for some riders, but the route would still be accessible.

**Figure 10-3**  
**Relocation of Route 37's Outer End to Reduce Cycle Times**



Since all existing riders would continue to be within walking distance, a shorter alignment, if implemented, should not have a significant ridership impact. The slightly shorter headway should theoretically increase ridership by three percent, or 25 trips per day. The alignment and headway changes combined would have no significant cost impact.

**Base** Base period headways would remain at 30 minutes to coordinate service with Routes 35 and 36. The three routes would alternate trips to provide 10 minute service on the trunk. There would be no cost or ridership impact.

**School** Two vehicles currently provide service at 30 minute headways during the school period. To coordinate service with Routes 35 and 36, which would operate at 20 minute headways, would require that a third vehicle be added to Route 37 so it would also operate at 20 minute headways. The three routes would then combine to provide trunk headways of seven, seven, and six minutes. This would cost approximately \$17,300 per year, and attract approximately 15 new trips per day.

**PM Peak** Coordination of PM peak service would require that Route 37 PM peak headways be increased to 18 minutes, up from a current average of 13 minutes, and a proposed 17 minutes without coordination. With 18 minute headways, there would still be a savings of two vehicles compared to current operations, and annual operating cost savings of approximately \$33,600. Routes 35, 36, and 37 would then alternate trips to provide six minute headways along the trunk.

On an all day basis, the coordination of Route 37 service with Routes 35 and 36 would save \$13,600 per year. One additional vehicle would need to be deployed in the school period, but two fewer would be deployed in the PM peak.

### **Improved Connections with Commuter Rail**

Direct connections are possible between Route 37 and commuter rail at West Roxbury Station on the Needham commuter rail line. However, schedules on the two services are not coordinated, so most transfers are very inconvenient.

As with Routes 35 and 36, improved connections with commuter rail would be dependent upon a revised commuter rail schedule with trains operating at regular headways. Until that time, Route 37 could not meet all trains without operating service at inconsistent headways, which would likely inconvenience more riders transferring from the Orange Line than would benefit from commuter rail. However, some marginal improvements could be made:

**AM Peak** During the AM peak, inbound commuter rail trains depart from West Roxbury Station at 6:25 am, 7:07 am, 7:51 am, and 8:26 am. The headways between these trips are 41, 45, and 35 minutes, respectively. With Route 37 operating at even 16 minute headways (see "LEVEL OF SERVICE" section for further information on proposed headways), it

would not be possible to coordinate all trips. However, fairly decent connections could be provided with the last three trips. Route 37 could be scheduled so that inbound bus trips arrived at the station at 7:00 am, 7:48 am, and 8:20 am, which would be seven, three, and six minutes before the train.

With coordinated service operating at 15 minute headways, similar connections could be made, except that buses would arrive to make the second two connections six and 11 minutes before the train, which would be less convenient. However, with coordinated service, only one of the three routes could be scheduled for the "best" connections. Since outer end ridership on Route 37 is the lowest among Routes 35, 36, and 37, the better connections should be set for Routes 35 and 36 than for Route 37.

Mid-day Connections Between the end of the AM peak and the start of the PM peak, rail service operates at either one or two hour headways. All of these trips operate at clock headways so that they could be coordinated with Route 37 if current 30 minute headways continued to be operated, or if headways were reduced to 20 minutes. However, the route could only be scheduled for close connections in one direction. Alternatively, an equal transfer time of approximately 10 minutes could be scheduled in each direction. Since 10 minutes would result in an inconvenient transfer, it would be better to coordinate closely one direction. Before 11:00 am, most Route 37 ridership is inbound, while after that time, most ridership is outbound. Therefore, total passenger wait time would be minimized by opting for close inbound connections through 11:00 am and close outbound connections after that time.

PM Peak During the PM peak and through the end of Route 37 service at 7:15 pm, headways at the West Roxbury station between five outbound trains are 35, 40, 40 and 35 minutes. These trains arrive at 4:30 pm, 5:05 pm, 5:46 pm, 6:24 pm, and 6:57 pm. With Route 37 operating at 17 or 18 minute headways, it would be possible to provide good connections with only two of the five trains—either the first two or the last two.

As mentioned in the previous chapter, if schedules are revised to provide better commuter rail connections, or if they occur by chance, both bus and rail schedules should indicate which connections are possible in order to facilitate these trips.

#### LEVEL OF SERVICE (Existing Alignment; No Service Coordination)

If Route 37 is not coordinated with Routes 35 and 36, there would be slightly more flexibility in setting service levels, which would allow layover time to be minimized and slightly shorter headways to be provided during certain



periods. These possible service levels are discussed in this section. However, since most Route 37 riders use only the trunk portion of the route and also regularly utilize Routes 35 and 36 as well, slightly shorter headways would likely be of less value to most riders than coordinated service. Therefore, the service levels discussed above in the "Coordination of Route 37 Service with Routes 35 and 36" section should be considered preferable to those discussed in this section.

Currently, Route 37 service is provided at headways of between 13 and 30 minute headways. AM peak headways are 20 minutes, PM peak headways are 13 minutes, and mid-day service is operated at 30 minute headways. With the exception of the AM peak (6:55 am to 8:15 am) where inbound peak loads average 59 passengers, excess capacity is provided and adjustments in service could improve productivity. Additionally, because existing cycle times are generally greater than that required to provide reliable service, these adjustments could result in vehicle savings during the early morning and PM peak.

**Early AM** Service is currently provided at 20 minute headways using three buses and a 60 minute cycle time. Based on Spring 1986 running time data, the cycle time during this period could be reduced to 42 minutes. This would allow for service to be provided at 21 minute headways using only two vehicles. This service change would save \$5,400 per year, and since the headway change would be only one minute, would have little impact on ridership or peak loads.

**AM Peak** A reduction of AM peak headways from 20 minutes to 16 minutes could relieve crowding and, if schedules are revised to reflect an optimal cycle time of 48 minutes for this period (see Table 10-5), could be accomplished without increasing vehicle requirements. The shorter 16 minute headways would reduce average peak loads from 59 passengers to 50, save 6.3 hours of passenger wait time, and attract 20 new trips along the outer end of the route. Along the trunk, the new Route 37 headways would change combined Route 35/36/37 headways by less than one minute and no ridership impact would be expected. Since no new vehicles would be involved, the cost of implementing this improvement would be low, at \$6,900 per year.

**Base and School** Currently two buses are used with a 60 minute cycle time to provide service at 30 minute headways. Based on observed running times, the cycle time could be reduced to 50 minutes, which would allow headways to be reduced to 25 minutes. Alternatively, one bus could be used to provide 50 minute headways.

Table 10-5  
Route 37 Schedule Statistics  
(All Figures in Minutes)

	3:00am- 6:59am	7:00am- 8:59am	9:00am- 1:59pm	2:00pm- 5:59pm	6:00pm- 8:29pm
<u>Inbound</u>					
Scheduled Run Time	16	20	20	22	18
Observed Run Time	20	23	20	20	18
STD of Obs Run Times	2.2	2.4	1.5	2.0	5.0
<u>Outbound</u>					
Scheduled Run Time	17	22	19	22	20
Observed Run Time	14	18	21	21	19
STD of Obs Run Times	3.2	1.7	2.8	3.6	3.4
<u>Round Trip</u>					
Scheduled Cycle Time	60	60	60	60	60
Sched RT Run Time	33	42	39	44	38
Obs RT Run Time	34	41	41	41	37
Sch Recovery Time	21	12	15	10	16
Obs Recovery Time	27	19	21	16	22
STD * 1.5	8	6	6	8	13
Optimum Cycle Time	42	47	47	49	50

Based on passenger wait time impacts, two vehicles should continue to be deployed. With 50 minute headways during the base period, one vehicle would be saved, resulting in vehicle hours savings of 5.3 per day and operating cost savings of \$30,900 per year. However, 65 daily trips would be lost and wait time for remaining passengers increased by 54.6 hours, or 10.4 hours for each hour of vehicle time saved. Conversely, 25 minute headways would increase outer end ridership by 20 trips per day and trunk ridership by up to 65 trips per day (where combined Route 35/36/37 headways would be reduced from an average of 10 minutes to nine minutes). This would reduce passenger wait time by 20.7 hours per day. The additional vehicle miles involved in the additional service would increase operating costs by \$19,000 per year.

School period impacts would be similar. Twenty-five minute headways would increase outer end ridership by 25 trips per day, although they should have little impact on trunk ridership. Passenger wait time would be reduced by 3.5 hours.

PM Peak Service is provided with five vehicles at 12 minute headways throughout most of the period. This is a higher level of service than operated in the AM peak and is not justified based on ridership. The

average peak load for the period was 27 passengers, and with one atypical exception, no trips were observed with standing loads. (The one trip with standing loads experienced a delay enroute to the extent that it also apparently carried trips that normally would have been carried by the following trip.)

By revising schedules to reflect observed running times, which are shorter than scheduled times, cycle times could be reduced to as low as 49 minutes. This would allow headways to be reduced to 10 minutes, which would not be warranted based on demand, or for one or two vehicles to be saved. To save one vehicle, 13 minute headways could be provided, or to save two vehicles, 17 minute headways could be provided.

With 13 minute headways, service would be similar to that now provided: 15 minute headways at the beginning of the period, then shortening to 12 minutes. No significant changes in either headways or loads would be expected, but operating costs would be reduced by \$12,000 per year. With 17 minute headways, operating cost savings would increase to \$34,600. This would result in the loss of 20 passenger trips along the outer end and increase the average peak load to 39 passengers, still below capacity. The increase in passenger wait time compared to the vehicle hour savings would be very small at only 1.0 hour of additional passenger wait time for each of the four hours of vehicle time saved.

**Evening** Excess capacity exists during the evening, with the average peak load at 28 passengers. Productivity could be improved and one vehicle could be saved by increasing headways from 20 minutes to 25 minutes within a revised 50 minute cycle time. This service modification would save \$14,100 per year at a cost of only 1.9 hours of passenger wait time per vehicle hour saved.

A summary of the proposed changes is included in Table 10-6.

## **RELIABILITY**

When ridechecked, 85 percent of the 80 trips on Route 37 departed on time, nine percent departed three or more minutes late, and six percent departed more than two minutes early. In total, of 12 off-schedule departures, there were seven late departures and five early departures. As shown in Table 10-7, most late departures occurred during the mid-day and most early departures occurred in the evening.

The cause of the off-schedule departures could not be determined. Observed round trip running times on Route 37 were close to scheduled times and



**Table 10-6**  
**Impacts of Service Refinements on Route 37 Outer End Ridership**  
**(Fall 1987)**

	<u>Early AM</u>	<u>AM Peak</u>	<u>Base</u>	<u>School</u>	<u>PM Peak</u>	<u>Evening</u>	<u>All Day</u>
<i>Original Service</i>							
Headways (min)	20	20	30	30	12	20	
Vehicles Required	3	3	2	2	5	3	
<i>Revised Service</i>							
Headways (min)	21	16	25	25	17	25	
Vehicles Required	2	3	2	2	3	2	
Vehicles Saved	1	0	0	0	2	1	
<i>Passenger/Service Impacts</i>							
Original Ridership	15	190	225	85	180	60	755
Increase/Decrease	0	20	20	5	-20	-5	20
Revised Ridership	15	210	245	90	160	55	775
Change in Pax Wait Time	+0.1	-6.3	-9.5	-3.5	+5.3	+2.3	-11.6
Change in Vehicle Hours	-0.5	0	0	0	-4.0	-1.2	-5.4
Add'l Pax Wait Time/ Vehicle Hour Saved	0.2	NA	NA	NA	1.3	1.9	2.1

**Table 10-7**  
**Route 37 On-Time Departure Performance**  
**(Both Variations)**

	<u>Early AM</u>	<u>AM Peak</u>	<u>Base</u>	<u>School</u>	<u>PM Peak</u>	<u>Evening</u>
3-5 Minutes Late	0%	0%	18%	22%	5%	0%
> 5 Minutes Late	0%	0%	0%	0%	0%	0%
> 2 Minutes Early	0%	0%	5%	0%	5%	30%
<b>On-Time</b>	<b>100%</b>	<b>100%</b>	<b>77%</b>	<b>78%</b>	<b>90%</b>	<b>70%</b>

relatively large amounts of layover time are allowed during all periods (as shown in Table 10-5 in the previous section). Further, early departures on one end are not linked to late departures on the other end. Some minor scheduling changes should be made to better match observed running times with schedule times (again, see Table 10-5 in the previous section), but these differences are not large enough to have caused the off-schedule departures,

and scheduled layover times are large enough to cover the differences that do occur.





---

## 11. Routes 38 & 51

---

*Route 38: Wren Street - Forest Hills*

*Route 51: Cleveland Circle - Forest Hills*

### ROUTE PROFILES

#### Route 38

Route 38 operates between the intersection of Wren Street and Saville Road in the Bellevue-Mount Vernon section of West Roxbury, and Forest Hills (see Figure 11-1). It operates past the edge of West Roxbury's Centre Street business district, the Weld Street residential area, Faulkner Hospital, Arnold Arboretum, and Monument Circle in Jamaica Plain. Most ridership is to and from Forest Hills.

Connections can be made from Route 38 to the Orange Line at Forest Hills, to Routes 35, 36 and 37 at Belgrade Avenue, to Route 48 at the intersection of Centre Street and South Street, to Route 42 at South Street, and to Routes 16, 21, 39, and 41 at Forest Hills. Connections can also be made to commuter rail at the Bellevue and Roslindale Village Stations on the Needham Line.

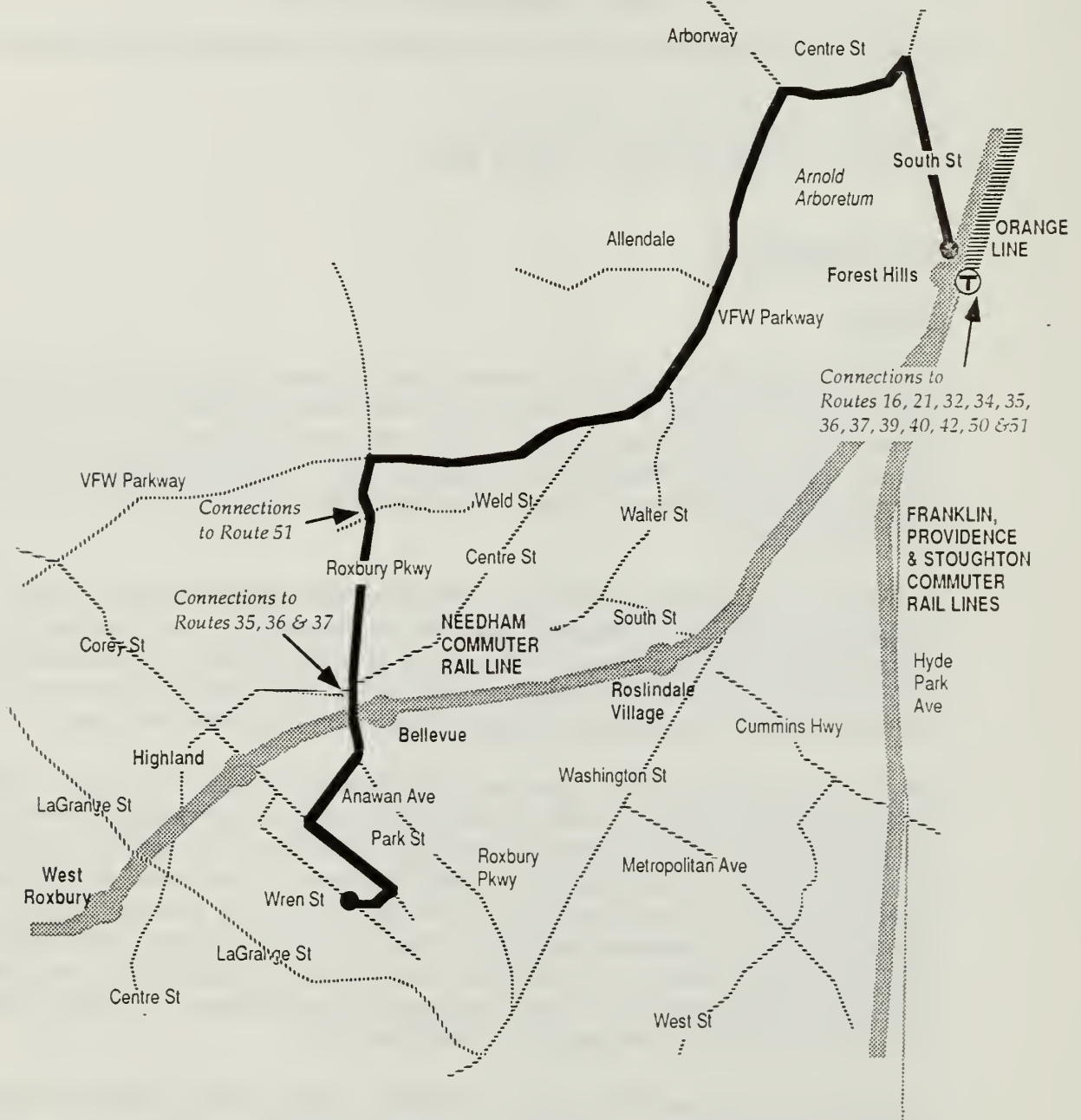
Route 38's schedule has changed significantly since ridechecks were conducted in the Spring of 1986. At that time, Route 38 operated between 5:35 am and 7:45 pm with 20 minute AM peak headways, 30 minute mid-day headways, and 12 to 15 minute PM peak headways. This schedule has since been revised to add one late night round trip (11:13 pm inbound; 11:40 pm outbound) and to increase headways. Headways during both peak periods have been increased to 22 minutes, and mid-day headways have been increased to 40 minutes.<sup>46</sup> These changes reduced the total number of trips provided from 72 per weekday to 64 (see Table 11-1).

As with other Forest Hills routes, the new Orange Line appears to have significantly increased ridership, in spite of the lower level of service. Ridership on Route 38 in the Spring of 1986 was 990 trips per day, including 650 trips per day to and from Forest Hills. By the Fall of 1987, MBTA

---

<sup>46</sup>One additional night round trip was also added in the Spring of 1988 (8:40 pm outbound; 9:05 pm inbound).

Figure 11-1  
Route 38: Wren Street - Forest Hills



pointchecks indicated that Forest Hills trips had increased to 900 per day, an increase of 38 percent. Pointchecks have not been conducted at other locations to gauge the impact of the lower level of service of non-Forest Hills

**Table 11-1**  
**Route 38 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1987): 5:47 am - 11:13 pm

	Average One-Way Length	One- Way Trips	Avg Headway (Min-Peak Dir)						All Day	
			EA	AM	Base	Sch	PM	Eve	VSM	VSH
Spring 1986	4.0	72	1T	18	36	18	18	4T	288.0	30.1
Fall 1987	4.0	65	1T	22	38	21	22	66	260.0	23.1
Change		-31%	--	+22%	+5%	+17%	+22%	--	-50%	-23%

ridership, but based on the change in the service level, a seven percent decrease is likely.<sup>47</sup> This would translate into a loss of approximately 25 trips per day, resulting in total ridership in the Fall of 1987 of 1,210 trips per day (see Table 11-2).

**Table 11-2**  
**Route 38 Weekday Ridership and Productivity Statistics**

	Weekday Boardings	Boardings/VSM							Boardings/ VSH All Day
		Early AM	AM Peak	Base	Sch	PM Peak	Eve	All Day	
Spring 1986	990	2.4	4.1	2.5	5.1	3.8	1.9	3.4	32.9
Fall 1987	1,210							4.7	52.3
Change	+22%							+38%	+59%

Percent of passengers 65 or older (Spring 1986): 14%

Percent without a car available for trip (Spring 1986): 64%

Spring 1986 peak load points: Inbound: Centre St. @ Arborway

Outbound: Centre St. @ Aldworth St.

In the Spring of 1986, Route 38 was the worst performing of all of the SOUTHBus routes in terms of passengers per vehicle mile and per vehicle hour. However, as also shown in Table 11-2, performance has significantly

<sup>47</sup>Based on arc elasticities for headway changes of -0.22 to -0.58 (depending upon the original headway), by time period.



improved since the new Orange Line opened and Route 38 service levels were reduced. Since that time, the number of passengers per vehicle mile has increased by 38 percent, and the number of passengers per vehicle hour has increased by 59 percent on an all day basis. However, since previous peak loads were very low (averaging 20 or less during peak periods), the ridership increase, even when coupled with the lower level of service, should not result in any crowding problems.

Ninety percent of Route 38's riders are residents of West Roxbury (38 percent), Roslindale (31 percent), or Jamaica Plain (22 percent). Work and school trips, which account for 68 percent of all trips, are mostly made to and from downtown Boston (44 percent), Jamaica Plain (21 percent) or Roslindale (16 percent). In addition, 14 percent of all trips are for shopping purposes and 17 percent for other purposes.

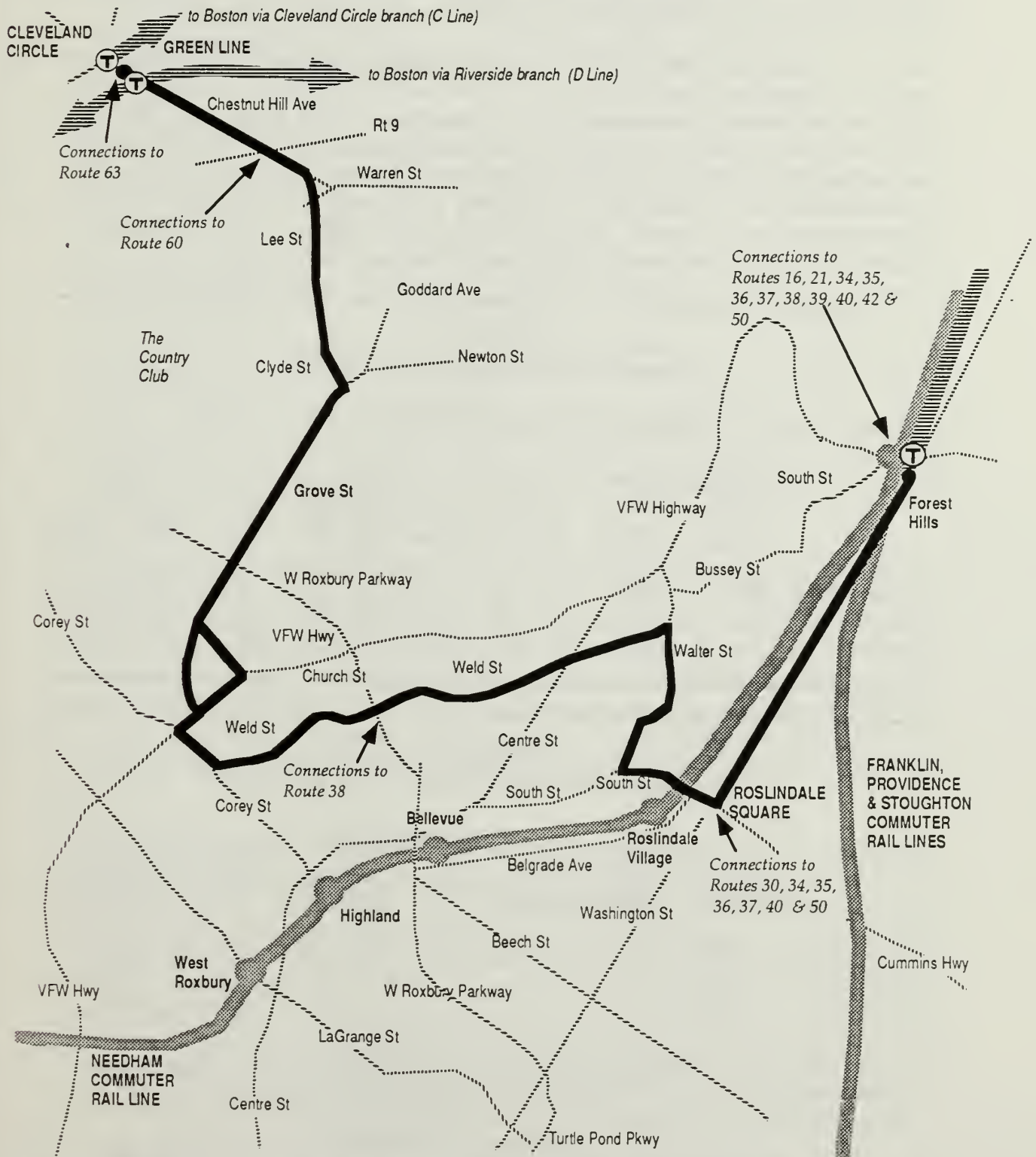
Along the outer end of Route 38, where most riders live, 92 percent walk to and from the route. At the inner end, towards Forest Hills, 51 percent transferred to the Orange Line in the Spring of 1986. However, recent increases in ridership to and from the Orange Line have increased this figure to approximately 74 percent. Correspondingly, the percentage of riders transferring to or from other buses or walking to and from the bus has declined to approximately 25 percent and 21 percent, respectively. Of those making bus transfers, most are to Route 39 (105 per day), followed by Route 30 (55), Route 42 (45), Route 16 (30), Route 34 (15), Route 37 (10), and Routes 29, 35 and 36 (5 each).

Route 38 riders have the lowest level of transit dependency of all SOUTHBUS riders. Although 14 percent are 65 or older, only 64 percent do not have a car available, and only 15 percent are from households with an annual income of \$15,000 or less (compared to 74 percent and 37 percent, respectively, for all SOUTHBUS riders combined). Seventy percent of the route's riders use the route five or more days per week.

### Route 51

Route 51 operates between Cleveland Circle and Forest Hills (see Figure 11-2). Unlike the other SOUTHBUS routes that are radial in nature, Route 51 has a circumferential orientation, although in many respects it acts as a radial route feeding either the Green Line at Cleveland Circle or the Orange Line at Forest Hills. From Cleveland Circle, Route 51 operates along Chestnut Hill Avenue, Lee Street, Clyde Street and Grove Street to Hancock Village in West Roxbury, then through the Weld Street area past the Hebrew Rehabilitation Center and the Arnold Arboretum, and then finally through Roslindale Square and along Washington Street to Forest Hills. In addition to the Orange and Green Lines, connections can also be made to Route 63 at

Figure 11-2  
Route 51: Cleveland Circle - Forest Hills



Cleveland Circle, Route 60 at Route 9 (Boylston Street), Route 38 at Weld Street, Routes 14, 30, 34, 35, 36, 37, 40, and 50 at Roslindale, as well as Routes 16, 21, 39, and 42 at Forest Hills. Connections can also be made to commuter rail at Roslindale Village and Forest Hills.

Service is operated between 5:55 am and 10:00 pm. There have not been any service changes between the Spring of 1986 and the present. During the peak and school periods, headways are 20 minutes, while base and PM peak headways range from 20 minutes to one hour (see Table 11-3). Total ridership in the Spring of 1986 was 1,825 trips per day. Through the Fall of 1987, MBTA pointchecks at Forest Hills indicate a ridership increase there of approximately 11 percent, or 120 trips per day. This would increase total ridership by seven percent to 1,955 trips per day (see Table 11-4).

**Table 11-3**  
**Route 51 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1987): 5:55 am - 10:00 pm

	Average One-Way Length	One- Way Trips	Avg Headway (Min-Peak Dir)						All Day	
			EA	AM	Base	Sch	PM	Eve	VSM	VSH
Spring 1986	8.6	66	--	20	41	20	20	49	277.2	41.8
Fall 1987	8.6	66	--	20	41	20	20	49	277.2	41.8
Change	--	0%	--	0%	0%	0%	0%	0%	0%	0%

**Table 11-4**  
**Route 51 Ridership and Productivity Statistics**

	Weekday Boardings	Boardings/VSM							Boardings/ VSH
		Early AM	AM Peak	Base	Sch	PM Peak	Eve	All Day	VSH All Day
Spring 1986	1,835	4.8	8.6	5.7	7.1	8.1	3.3	6.6	43.6
Fall 1987	1,955							7.1	46.8
Change	+7%							+8%	+7%

Percent of passengers 65 or older (Spring 1986): 17%

Percent without a car available for trip (Spring 1986): 69%

Spring 1986 peak load points: Inbound: Cleveland Circle

Outbound: Forest Hills



Peak loads were well below seated capacity during all periods when observed in the Spring of 1986, with the highest observed peak load on any single trip at 56 passengers (6:30 am inbound trip). In total, only seven trips had peak loads exceeding 40 passengers. As a result, existing schedules should remain adequate to handle the estimated seven percent ridership increase.

Although rapid transit connections are possible at both ends of Route 51 and travel is fairly well balanced between directions, the dominant direction is towards Forest Hills in the AM peak, and from Forest Hills in the PM peak. In the AM peak, 63 percent of all travel is inbound. In the PM peak, 52 percent is outbound and 48 percent is inbound. On an all day basis, 800 trips per day are made to and from Cleveland Circle, and 865 per day are made to and from Forest Hills. In general, directional travel on Route 51 appears to reverse at the Brookline/West Roxbury line. Most of Route 51's riders from Brookline use the segment between the Brookline line and Cleveland Circle, and most of the West Roxbury and Roslindale riders travel in the direction of Forest Hills. However, a significant number of trips are also made in the opposite directions, with approximately 34 percent of all trips crossing the Brookline/West Roxbury line. For the route as a whole, 33 percent of the route's riders live in Brookline, 31 percent in West Roxbury, and 19 percent in Roslindale.

Most Brookline riders live either in the Cleveland Circle area or in Hancock Village, while in West Roxbury, most riders live in the Weld Street area. In addition, a large number of riders also use the route for travel only between Roslindale Square and Forest Hills (305). These riders are equally well served by any of the routes travelling between these two areas (Routes 34, 35, 36, 37, 40 or 50), and in most cases, probably use the first bus to come along. For work and school trips, most riders travel to and from downtown Boston (35 percent), Brookline (20 percent), and West Roxbury and Brighton (10 percent each).

Transfer characteristics at both ends of Route 51 are fairly similar. Fifty-three percent walk to or from the bus, while 42 to 45 percent make a transfer with rapid transit or another bus. At the Cleveland Circle end, 38 percent transfer to the Green Line and seven percent transfer (120 transfers per day) to Route 63. At the Forest Hills end, 20 percent transfer to the Orange Line, and 22 percent transfer to another bus. Bus transfers at the inner end of the route are to Route 34 (70), Route 39 (60), Route 21 (25), Routes 32 and 16 (20 each), Routes 30 and 35 (15 each), Routes 21 and 32 (10 per route), and Route 40 (5). Additionally, 15 transfers per day are made with Route 60 at the intersection of Chestnut Hill Ave and Route 9.

Although the percentages of young and elderly riders on Route 51 are above average for the corridor, the percentages of low income passengers and riders

without a car available are the fourth lowest (37 percent and 69 percent, respectively). This is likely due to the number of Brookline riders, who, in general, are more affluent and less transit dependent than residents of the areas of Boston served by the other routes.

## SERVICE COVERAGE

### Overall Assessment

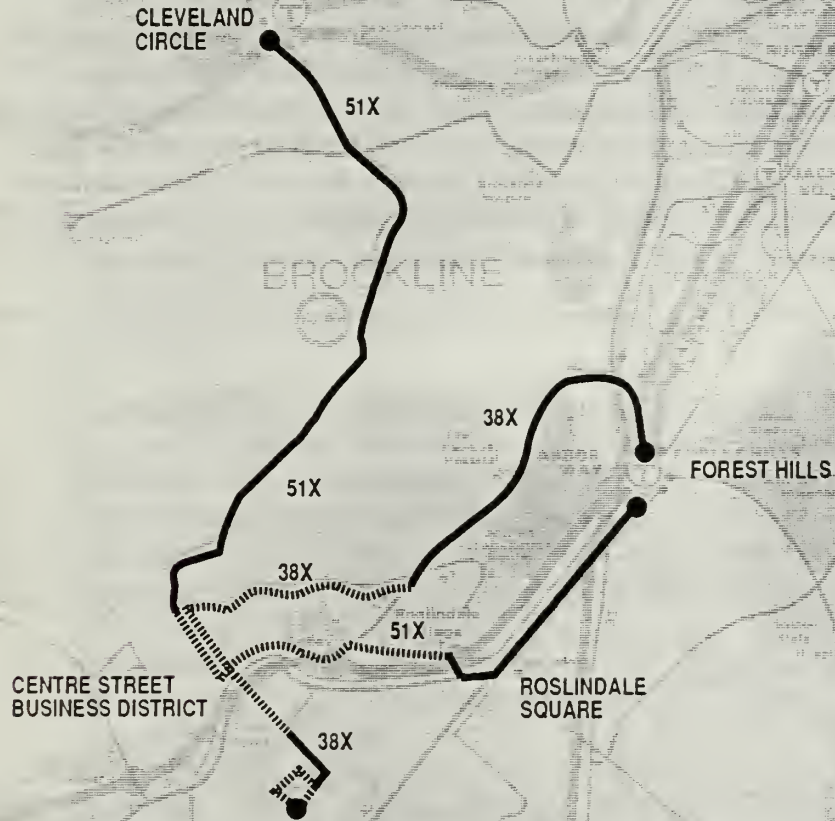
Existing Route 38 and 51 service is designed primarily to serve trips to and from downtown Boston through Forest Hills: Route 38 from the Bellevue-Mount Vernon area, and Route 51 from the Weld Street area. As with other West Roxbury and Roslindale service, these service configurations exist because downtown Boston is the largest market, and because local ridership on existing service is relatively light. Neither of the routes provides service to West Roxbury's Centre Street business district. Route 38 crosses Centre Street east of the business district, and Route 51 operates approximately one-half mile away at its closest point. As a result, trips from these areas which are short by automobile are time consuming by bus, requiring travel away from West Roxbury Center for a transfer with Route 35, 36, or 37 along LaGrange Street.

To provide better service for these local trips, Route 38 could be rerouted to provide service through the Centre Street business district, and to provide better connections with commuter rail. As shown in Figure 11-3, Route 38 could be rerouted to provide service to the Weld Street area by operating it from Park Street to Corey Street to Weld Street and then along the alignment of Route 51 to Centre Street, where it would rejoin its present alignment to Forest Hills. (For discussion purposes, this route is called Route 38X.) This realignment would leave the area along Centre Street between Belgrade Avenue and Weld Street unserved. However, since the revised Route 38 would duplicate Route 51 service along Weld Street, Route 51 could then be rerouted to serve that area. Beyond Forest Hills, Route 51 could stay on South Street to Centre Street to Corey Street, where it would then rejoin its existing alignment. This modification would also link West Roxbury's business district with Cleveland Circle and the Green Line. At the BTD's transportation workshops, connections between West Roxbury and Chestnut Hill were also discussed. The change to Route 51 would make these trips possible, albeit with a transfer.

As for coordination with commuter rail, connections from the existing Route 38 are possible at the Bellevue station. However, considering both existing and possible revised commuter rail schedules and the most cost effective service levels for Route 38 (as further discussed below), not all trips on the



**Figure 11-3**  
**Route 38X and Route 51X Alternatives**



**Key:**

Route 38X - Route 38 revised  
Route 51X - Route 51 revised

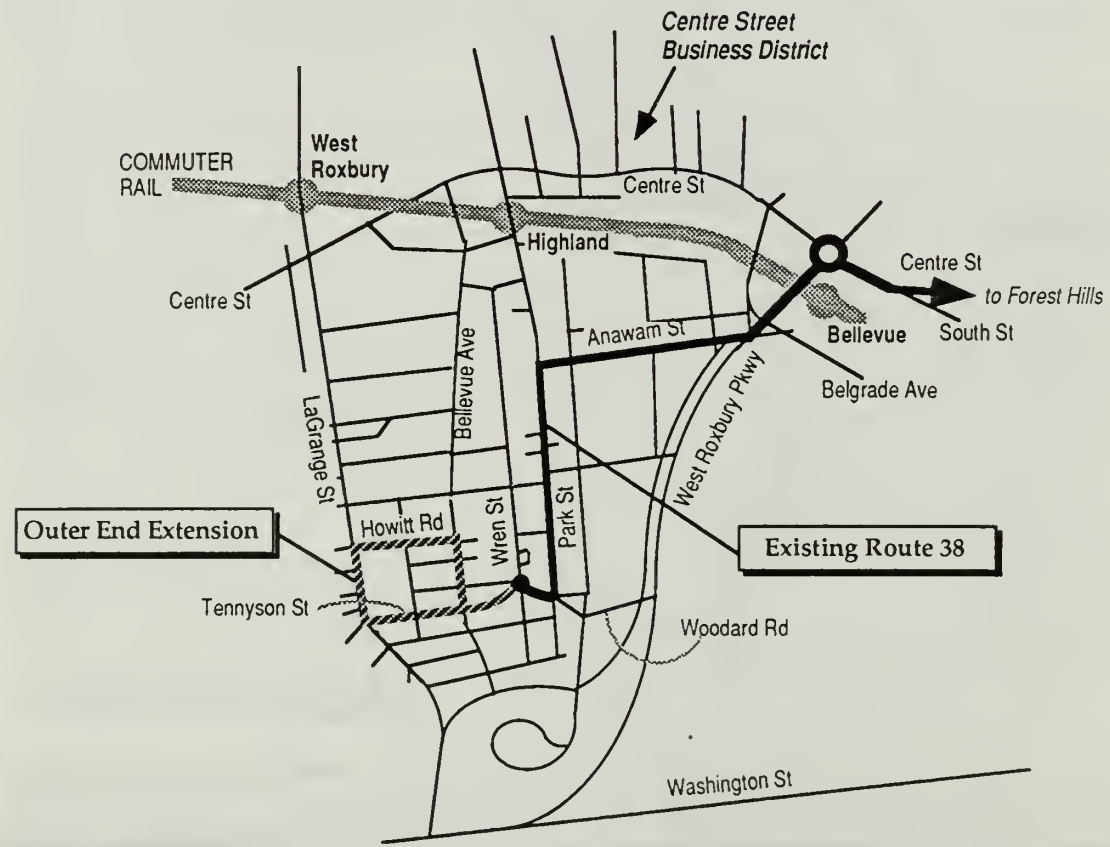
— Unchanged Segment  
- - - Realigned Segment



two services could be coordinated. On Route 51, commuter rail connections are only possible at Forest Hills. However, due to much higher service levels on the Orange Line, the connections to commuter rail are far less attractive. While transfer data is not available, transfer volumes between Route 51 and commuter rail are presumably very low and would not warrant a large degree of effort to coordinate services.

Lastly, service coverage on Route 38 could be improved in the Bellevue area by extending the outer end of the route slightly to provide a short loop at the outer end. This loop, which would be similar to that on the outer end of Route 37, would operate from the present end of the route at Wren Street along Tennyson Street to LaGrange Street to Howitt Road to Bellevue Street back to Tennyson Street (see Figure 11-4). This loop, which is assumed as part of Route 38X, could also be added to the existing route.

Figure 11-4  
Route 38 Outer End Extension



### Reroutings of Routes 38 and 51 to Provide Increased Local Service Coverage

With the reroutings of Routes 38 and 51 shown in Figure 11-3, riders that travel to, from, or through Forest Hills would be relatively unaffected. Many Route 38 riders would instead be served by Route 51X and many Route 51 riders would instead be served by Route 38X, but most would be equally well served. Residents of all areas now served by Routes 38 and 51 would also be provided with new access to the Centre Street business district. There would also be new service along South Street in Roslindale that would provide direct service to Forest Hills and Cleveland Circle from an area that is currently not well served. The major adverse impact of the changes would be on existing Route 51 riders that travel between the Weld Street area and Cleveland Circle. The Weld Street area would instead be served by Route 38X, which would operate between the Bellevue area and Forest Hills. Trips to Cleveland Circle and other parts of Brookline from the Weld Street area would require a transfer from Route 38X to Route 51X. These passenger impacts are described in more detail below.

Route 38/38X On Route 38, the outer end of the route would be extended to provide better coverage to the Bellevue-Mount Vernon area, and the segment between Centre Street and the Arnold Arboretum would be realigned to serve the Weld Street area (as shown in Figure 11-3). Along the outer end of the route beyond Centre Street, all existing riders would continue to be served by Route 38 (as Route 38X), or by Routes 35 or 36. The short extension at the outer end would make service more convenient to some of these riders, and would also bring service to some residents that are currently not directly served. However, due to the realignment along Weld Street, travel times for these riders to Forest Hills would increase by six to eight minutes (from 14 - 20 minutes to 20 - 28 minutes) if they continued to use Route 38. Alternatively, most of these riders could also use Route 37X, if implemented, which would shorten travel times to Forest Hills to approximately 14 to 16 minutes. Based on 1986 ridership patterns, up to 75 existing riders would take advantage of faster Route 37X service and 75 riders would continue to use Route 38 (see also Table 11-5).

Between Park Street and Weld Street, instead of serving Anawan Road and Centre Street, Route 38X would operate through the Centre Street business district and through the Weld Street area. This new alignment would link both the Bellevue-Mount Vernon area and the Weld Street area with the Centre Street business district, as well as provide cross-town service between the two. Between the intersection of Weld Street and Centre Street, and Forest Hills, Route 38X would follow the alignment of the existing route.

Table 11-5  
Ridership Impacts of Route 38X and 51X Alternatives

	Shift to:				New Transfers	
	Rt 37X	Rt 38X	Rt 51X	Total	Imposed	Between Routes
<b>Existing Riders Shift from:</b>						
<u>Route 38</u>						
•Outer End Riders (beyond Centre Street):						
- Best served by 37X	75			75	0	
- Best served by 38X		75		75	0	
- Not directly served by new routes (transfer req'd)		75	75	150	75	38X-51X
•Middle Segment Riders (Anawam/W. Rox Pkwy - Centre/Fletcher)						
- Best served by 51X			80	80	0	
- Not directly served by new route (transfer req'd)		110	150	260	150	38X-51X & 38X-39
•Riders on Inner End Only (Forest Hills - Centre/Fletcher)						
- Trips unaffected		795		795		
•Subtotal	75	1,055	305	1,435	225	
<u>Route 51</u>						
•Outer End Riders Only (Weld/Corey - Cleveland Circle)						
- Trips unaffected			505	505	0	
•Middle Segment Riders (along Weld Street)						
- Instead served by Rt 38X		150		150	0	
- Instead served by Rt 51X			345	345	0	
- Not directly served by new routes (transfer req'd)		515	505	1,020	515	38X-51X & 51X-39
•Inner End Riders Only (Weld/Centre - Forest Hills)						
- Trips unaffected			470	470	0	
•Subtotal	0	665	1,800	2,465	515	
<b>New Trips Attracted</b>		0	220	220	NA	
<b>Transfer Losses</b>						
(due to imposed transfers)		-140	-140	-280	NA	
<b>Total<sup>48</sup></b>	<b>+75</b>	<b>1,585</b>	<b>2,190</b>	<b>3,890</b>	<b>+460</b>	

<sup>48</sup>Figures prefixed with a plus symbol (+) indicate increases, other figures indicate grand totals.



Although service along Anawan and Centre Streets would be discontinued, the 335 existing riders along that segment would still be within one-quarter mile of other service. Anawam Street riders would be within one-quarter mile of Routes 38X, 35 and 36, all of which would serve both the Centre Street business district and Forest Hills. The Centre Street segment would be within one-quarter mile of Route 38X on Weld Street or Route 51X on South Street. However, not all of the 335 Centre Street trips would be directly served as they now are. One hundred and ten existing riders would be required to make a transfer between Routes 38X and 51X, and 40 riders would need to transfer between Route 38X and Route 39 (on South Street). The imposition of the transfer would likely result in the loss of approximately 25 of these riders.

Along Centre Street, to the west of the Arnold Arboretum, service to Forest Hills would be unchanged, but new service to the Centre Street business district would be provided. Most Route 38 riders only use this segment of the route between the intersection of Centre and Weld Street and Forest Hills (625 of 990 daily riders in 1986), and would therefore be unaffected by alignment changes beyond that area. Ridership from this area to the Centre Street business district would likely be light. The total market for work trips is only 15 per day. Assuming a 15 percent transit mode split, which is typical for this area, only two of these work trips would be expected to be made on Route 38X. Including non-work trips at 55 percent of work trips, and transfer trips at six percent of local trips (based on usage of Routes 35, 36 and 38 to the same area), a total of only five trips per day to and from the Centre Street business district would be expected.

Some new ridership to Forest Hills and downtown Boston could also be attracted along the new segment along Corey Street north of Centre Street. Direct service would be provided where none is now available, but most of the area that would be served is already within one-quarter mile walking distance of Route 51, or Routes 35, 36 and 37. Therefore, more convenient service would be provided to existing transit users, but gains in new ridership would be small.

In addition, Route 38X would carry many riders that now use Route 51 since it would replace Route 51 service to the Weld Street area. Approximately 150 existing Route 51 riders would be served by Route 38X in the same manner that they are now served, but a transfer would be required for 505 other trips. Most of these transfers would be between Routes 38X and 51 and would be made by residents of the Weld Street area traveling to and from Cleveland Circle. The imposed transfer would likely result in the loss of 105 of those trips.

Total ridership on Route 38X would be approximately 1,585 trips per day, as compared to Fall 1987 ridership of 1,210 trips per day. However, nearly

all of this increase would be due to Route 51X riders transferring to Route 38X to complete trips that they now make completely on Route 51, and would not represent new ridership.

Route 51/51X To link the Centre Street business district to Cleveland Circle and to provide Forest Hills service from sections of West Roxbury and Roslindale that are currently not well served, Route 51 would be moved from Weld Street (which would instead be served by Route 38X) to South Street. This alignment would also replace Route 38 service between South Street and Weld Street. For trips that continue to be made on Route 51 (as Route 51X), there would be no significant change in travel times.

Of 1,955 daily Route 51 riders, most would be relatively unaffected by this change since the segments between Forest Hills and Roslindale Square and between Weld Street and Cleveland Circle would remain unchanged. However, between Roslindale Square and Weld Street most existing riders would be affected. Of the 990 riders that had one trip end on this segment in the Spring of 1986, 485, or over half, travel to and from Cleveland Circle. Continuation of these trips with Routes 38X and 51X would require a transfer between Route 38X and Route 51X at the intersection of Pomfret and Corey Streets. Assuming similar headways as those now provided, this transfer would likely result in the loss of 110 of these trips. In addition, 150 existing Route 51 riders would instead be served by Route 38X, but in the same manner as they are now served by Route 51.

The new alignment would provide new service on South Street between Roslindale Square and Corey Street. This service would operate parallel to the existing alignment approximately one-half mile to the south of Weld Street and north of the railroad tracks, which is an area now only partially served by existing Routes 38 and 51.<sup>49</sup> Based on the trip attraction characteristics of existing Route 51 service, this service could attract up to 220 new trips per day, most of which would be trips through Forest Hills to downtown Boston.

Total ridership on Route 51X is estimated at approximately 2,190 trips per day, 12 percent higher than the current Route 51 total of 1,955. This would include 110 riders that would shift from Route 38, 185 transfers from Route 38X, and 220 new trips that would be attracted by new service on South Street between Roslindale Square and the Centre Street Business District. One hundred and fifty trips would shift to Route 38X, and a new transfer would be imposed on 485 existing riders. The imposition of the new transfers would result in a loss of 135 of those trips.

---

<sup>49</sup>This areas is also geographically within one-quarter of a mile of Routes 35, 36 and 37 along Belgrade Avenue, but because of the railroad tracks between Belgrade Avenue and South Street, it is not accessible to those routes.



**Overall Impact** Compared to existing Route 38 and 51 service, the Route 38X and 51X alternatives would result in net ridership losses and impose transfers on a large number of existing riders. In total, 220 new daily trips would be attracted by the increased service coverage, but 740 transfers would be imposed on existing riders. The imposition of these transfers would likely result in the loss of 275 of those trips. Therefore, the total ridership impact would be a loss of 55 trips and the imposition of 465 new transfers.

Further, most of the new transfers resulting from the Route 38X/51X configuration would be imposed on existing riders from the Weld Street area that travel to Brookline or the Green Line at Cleveland Circle (475 of the total 725 new transfers). The high travel volumes between the two areas also imply that Route 51 could not be routed to serve the Centre Street business district as well as Cleveland Circle without inconveniencing large numbers of existing riders.

#### **Improved Service Coverage at Outer End of Route 38**

Route 38's outer terminal is located at the intersection of Wren Street and Woodward Road in the Bellevue area of West Roxbury. Service coverage in this neighborhood could be improved by extending the outer end as shown in Figure 11-4. This extension would bring service to within walking distance of an additional 480 employed residents. Of these, 135 make trips within Route 38's primary market: local trips, and trips to the Financial District, Government Center, Back Bay, and Park Square. Based on transit usage of other residents of West Roxbury that are served by Route 38, approximately 25 of these residents would use Route 38. Another five persons would be attracted from beyond one-quarter mile, and approximately 25 people would use the service for non-work trips. In total, the extension would increase ridership by up to 105 trips per day.

The extension would add 1.1 miles and nine minutes of running time to each round trip. To accommodate this additional distance and time within existing vehicle deployment levels would require that cycle times be increased to 50 minutes. This, in turn, would require that headways be increased during peak periods from 22 to 25 minutes, and during the mid-day from 40 to 50 minutes. These longer headways would reduce ridership by approximately 70 trips per day, but overall, there would be a net ridership gain of 35 trips per day.

#### **Improved Connections with Commuter Rail**

Direct connections are possible between Route 38 and commuter rail at the Bellevue Station on the Needham commuter rail line. However, schedules on the two services are not coordinated, and most transfers are very



inconvenient. At the present time, with commuter rail operating at irregular headways, Route 38 could not meet all trains without also operating at irregular headways, which would likely inconvenience more riders transferring from the Orange Line than would benefit from commuter rail.

Even with a revised commuter rail schedule, presumably with commuter rail service operating at 30 minute peak period headways, coordination with Route 38 would be problematic. Depending on what other changes were made, Route 38 would operate at 20, 22 or 25 minute peak period headways and 40 or 50 minute off-peak headways (as discussed in the previous section and below in the "LEVEL OF SERVICE" section). These schedules would not be compatible and would allow only specific trips to be coordinated. However, as mentioned in the previous chapter, for connections that do occur, both bus and rail schedules should indicate which connections are possible in order to facilitate these trips.

## LEVEL OF SERVICE

### Route 38

Route 38 service is provided at 22 minute headways during both peaks, 40 minutes during the midday, and at an average of 66 minutes in the evening. The route operates below capacity throughout the day. However, only one or two vehicles are deployed throughout the day, leaving little flexibility in alternative scheduling. During the AM peak, school and PM peak periods, when two vehicles are deployed, the longer headways that would result from the elimination of one vehicle would result in large increases in passenger wait time compared to vehicle savings. As shown in Table 11-6, passenger wait time would increase by 17 to 22 hours for each hour of vehicle time saved. Therefore, vehicle deployment levels should remain as they are.

Within existing vehicle deployment levels, some small level of service improvements could be made. Currently, Route 38 operates at 22 minute headways with a 44 minute cycle time during peak periods and most of the school period. Based on observed running times, a 40 minute cycle time could be operated during the AM peak, which would allow peak period headways to be reduced slightly from 22 to 20 minutes.

During the school and PM peak periods, Route 38 experiences lateness problems due to inadequate cycle times. As further discussed in the "RELIABILITY" section, 24 minute headways are needed to improve on-time performance.

Table 11-6  
 Passenger and Service Impacts of Route 38 Service Reductions

	<u>AM Peak</u>	<u>School</u>	<u>PM Peak</u>
<i><u>Existing Service</u></i>			
Headways (min)	22	21	22
Vehicles Required	2	2	2
<i><u>Eliminate One Vehicle</u></i>			
Headways (min)	38	47	47
Vehicles Required	1	1	1
<i><u>Passenger/Service Impacts</u></i>			
Original Ridership	370	245	265
Ridership Loss	80	45	75
Increase in Pax Wait Time (hrs)	38.6	19.8	39.3
Vehicle Hours Saved	2.1	0.9	2.3
Increased Pax Wait Time/ Vehicle Hour Saved	18.1	22.0	17.1

During the evening, Route 38's schedule is irregular, with outbound headways ranging from 25 to 120 minutes. In the inbound direction, headways are as long as 128 minutes. In the Winter 1989 schedule, outbound trips depart from Forest Hills at 6:40 pm, 7:20 pm, 8:40 pm and 10:40 pm; inbound trips depart at 6:35 pm, 7:01 pm, 7:44 pm, 9:05 pm and 11:13 pm. Ridership on all trips is fairly low, averaging four passengers inbound and 12 passengers outbound in the Spring of 1986.

The reason for the irregular schedule is unclear and is presumably inconvenient and confusing to riders. In the absence of a specific rationale for this schedule, more consistent headways should be provided. To provide 40 minute headways outbound throughout the period until 10:40 would require the operation of three additional round trips (with outbound departures of 8:00 pm, 9:20 pm, and 10:00 pm at a cost of \$19,300 per year. Alternatively, the last trip could be shifted from 10:40 pm outbound to 8:00 pm outbound, with service ending after the 8:40 pm outbound round trip at no cost.

Of the two alternatives, the second would likely be the most cost effective. Assuming ridership on the three new trips would be similar to existing evening service on Route 38, this change would generate only 50 new trips. Productivity in terms of passengers per vehicle mile would be low and below MBTA standards, at 20 passengers per vehicle hour and 2.1 passengers per vehicle mile. The shifting of the late trip to 8:00 pm would likely have little overall ridership impact, and therefore no impact on productivity, but would

reduce the span of service. However, the change would simplify the route and present a more rational schedule to the public.

### Route 51

Route 51 headways vary from 20 to 49 minute headways between 5:55 am and 10:00 pm. Average headways are 20 minutes in both peaks and the school period, 41 minutes in the base period, and 49 minutes in the evening. When the route was ridechecked in the spring of 1986, all trips except three AM peak trips operated below seated capacity. During the AM peak, the maximum load observed was 57 passengers, and the average for the period was 37. In the peak half hour, peak loads averaged 49 passengers. Further, peak loads occurred just before the ends of the route (inbound at Forest Hills, outbound at Cleveland Circle); therefore crowding was of short duration. Even with the estimated seven percent ridership increase through the Fall of 1987, crowding should not have become a problem.

Given current loads, headways could be increased without causing crowding. However, as discussed in Chapter 13, all Route 51 trips are interlined with Route 50 trips and service levels are already relatively low. The interlining with Route 51 is designed to work around awkward cycle times on both routes, but especially on Route 51, and is significantly more efficient than operating each route independently. As was discussed in detail in Chapter 13 (Route 50), service levels on both routes should remain as they are.

## RELIABILITY

### Route 38

During the Spring of 1986, 25 percent of the 72 trips on Route 38 departed off-schedule. Most of the off-schedule departures were late departures (16), and most of the late departures occurred outbound (11). Further, most occurred during the school and PM peak periods. During these periods, service is operated with a cycle time of 40 minutes. However, observed running times indicate that a minimum cycle time of 47 minutes is needed (see Table 11-7). To solve the lateness problems without increasing vehicle requirements, headways should be increased from 22 to 24 minutes, allowing cycle times to be increased to 48 minutes. This increase would not cause any crowding problems.

Observed round trip run times differed from scheduled run times during other periods as well, with observed run times ranging from five minutes less than scheduled to six minutes greater than scheduled. In most cases where scheduled run time appears low, enough recovery time was provided



**Table 11-7**  
**Route 38 Schedule Statistics**  
**(All Figures in Minutes)**

	3:00am- 6:59am	7:00am- 8:59am	9:00am- 12:59pm	1:00pm- 5:59pm	6:00pm- 8:29pm	8:30 pm- 2:59 am
<u>Inbound</u>						
Scheduled Run Time	13	20	16	17	15	13
Observed Run Time	18	17	15	20	16	16
STD of Obs Run Times	4.1	2	1.5	3.1	2.2	--
<u>Outbound</u>						
Scheduled Run Time	14	17	16	18	16	14
Observed Run Time	14	15	15	19	16	18
STD of Obs Run Times	1.3	2.1	1.2	2.1	1.1	--
<u>Round Trip</u>						
Scheduled Cycle Time	40	44	40	44	40	40
Sched RT Run Time	27	37	32	35	31	27
Obs RT Run Time	32	32	29	39	32	34
Sch Recovery Time	24	17	8	19	9	13
Obs Recovery Time	19	22	11	15	8	6
STD * 1.5	8	6	4	8	5	--
Optimal Cycle Time	40	38	33	47	37	41

to prevent subsequent trips from departing late. However, some improvements in running time performance could be achieved if scheduled statistics were revised to reflect actual running times, as presented in Table 11-7.

### Route 51

On-time performance for Route 51 was 92 percent, with five out of the 65 daily trips departing three to five minutes late. The source of these late departures could not be determined. Although outbound observed run times are greater than scheduled run times, enough recovery/layover time is provided to prevent succeeding trips from departing late.

Although the schedule provides enough layover/recovery time so that cycle times are adequate, some improvements in running time performance along the route could be achieved by adjusting scheduled running times to reflect actual running times. As shown in Table 11-8, improvements could be made during all schedule periods. No vehicle savings would result from these schedule changes, as cycle times are long due to the interlining with Route 50. However, slight gains in schedule adherence could be obtained from the suggested schedule adjustments.

**Table 11-8**  
**Route 51 Schedule Statistics**  
**(All Figures in Minutes)**

	<u>3:00am- 6:59am</u>	<u>7:00am- 8:59am</u>	<u>9:00am- 3:29pm</u>	<u>3:30pm- 5:59pm</u>	<u>6:00pm- 8:29pm</u>	<u>8:30pm- 2:59am</u>
<i><u>Inbound</u></i>						
Scheduled Run Time	27	31	30	33	29	27
Observed Run Time	33	30	27	31	27	25
STD of Obs Run Times	0	2.4	3.3	3.6	4.2	7
<i><u>Outbound</u></i>						
Scheduled Run Time	21	23	22	23	22	21
Observed Run Time	28	29	28	33	23	25
STD of Obs Run Times	2.0	2.6	3.1	4.2	4.0	--
<i><u>Round Trip</u></i>						
Scheduled Cycle Time	80	80	70	80	80	80
Sched RT Run Time	48	54	52	56	51	48
Obs RT Run Time	61	59	56	64	50	50
Sch Recovery Time	32	26	18	24	29	32
Obs Recovery Time	19	21	14	17	30	30
STD * 1.5	3	8	10	12	12	--
<i>Optimal Cycle Time</i>	64	62	62	68	63	58

## 12. Route 40

*Route 40: Georgetowne - Forest Hills*

### ROUTE PROFILE

Route 40 operates from the Georgetowne residential development in Hyde Park to Forest Hills via Washington Street. As with most Forest Hills routes, Route 40 serves primarily as a feeder route to Forest Hills, providing service between 5:50 am and 6:55 pm. In the Spring of 1986, 30 minute headways were operated until the PM peak, when headways were 20 minutes. In the Spring of 1987, schedules were changed to provide 25 minute headways throughout the day. The headway reductions were possible within existing cycle times and did not involve the use of additional vehicles. The headway increase in the PM peak saved one vehicle. However, neither the total number of trips operated, nor the span of service, has changed (see Table 12-1).

Table 12-1  
Route 40 Weekday Service Statistics

Hours of Operation (Spring 1986 and Fall 1987): 5:50 am - 6:55 pm

	Average One-Way Length	One- Way Trips	<u>Avg Headway (Min-Peak Dir)</u>						<u>All Day</u>	
			<u>EA</u>	<u>AM</u>	<u>Base</u>	<u>Sch</u>	<u>PM</u>	<u>Eve</u>	<u>VSM</u>	<u>VSH</u>
<i>Spring 1986</i>	4.0	58	1T	30	30	30	20	20	261.0	26.4
<i>Fall 1987</i>	4.0	58	1T	25	25	25	25	25	260.0	26.1
<i>Change</i>	--	--	--	-16%	-16%	-16%	+25%	+25%	0%	-1%

In the Spring of 1986, total ridership was 1,180 trips per day, with 59 percent of all trips to or from Forest Hills. By Fall 1987, based upon MBTA pointchecks, the number of trips to and from Forest Hills had increased by nine percent, or 65 trips per day. This would have increased total ridership to approximately 1,245 trips per day, with up to 61 percent traveling to or from Forest Hills (see Table 12-2). This increase is the smallest observed on any of the Forest Hills



**Figure 12-1**  
**Route 40: Georgetowne - Forest Hills**

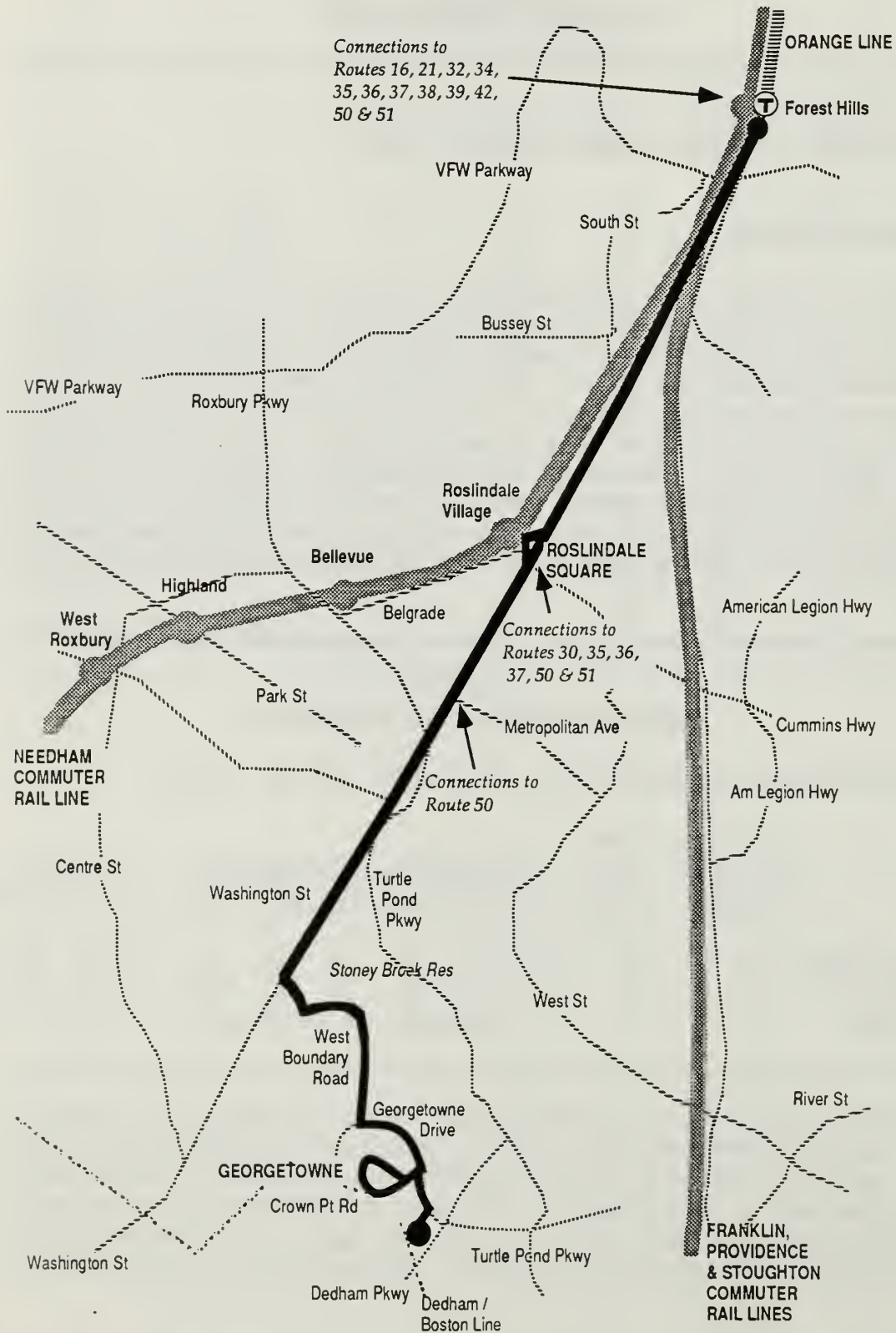


Table 12-2  
Route 40 Weekday Ridership and Productivity Statistics

	Weekday Boardings	Boardings/VSM						All Day	Boardings/ VSH All Day
		Early AM	AM Peak	Base	Sch	PM Peak	Eve		
<i>Spring 1986</i>	1,180	0.4	6.1	4.9	5.0	3.6	1.4	4.5	44.7
<i>Fall 1987</i>	1,245							4.8	47.7
<i>Change</i>	+6%							+7%	+7%

Percent of passengers 65 or older (Spring 1986): 25%

Percent without a car available for trip (Spring 1986): 73%

Spring 1986 peak load points: Inbound: Roslindale Square

Outbound: Roslindale Square

routes in the corridor, and current schedules should be adequate to accommodate these increases. Ridership among both groups is highly directional; in the AM peak, 84 percent of the travel is inbound, while in the PM peak, 79 percent is outbound.

Most Route 40 trips are made by residents of Hyde Park (57 percent) or Roslindale (29 percent). Most work and school trips, which account for 61 percent of all Route 40 trips, are made to downtown Boston (48 percent), Jamaica Plain (13 percent), Hyde Park (10 percent) or Roslindale (eight percent). As would be expected, most riders walk to the route at the outer end (94 percent), but most transfer at the inner end of their trip at, or towards, Forest Hills. In the Spring of 1986, 46 percent of all trips involved a transfer to or from the Orange Line; by the Fall of 1987, up to 60 percent transferred. Bus transfers in 1986 were made at the inner end of 25 percent of all trips; in the Fall of 1987, due to an increased number of Orange Line transfers as a percent of the total, this figure is approximately 18 percent. Most bus transfers are made with Route 39 (170 per weekday), followed by Route 30 (40 per day), Route 35 (20), Routes 34 and 42 (15 each), Route 37 (10), and Routes 22, 35 and 36 (5 each).

Route 40 riders are among the most transit dependent of the SOUTHBus corridor in terms of age and income. This is due in large part to relatively high percentages of low income and elderly residents at Georgetowne. One-quarter of the route's riders are 65 or older, and 57 percent are from households with annual incomes of \$15,000 or less per year. However, while 73 percent do not have a car available for their trip, this percentage is slightly below the corridor average of 74 percent. Nearly half of Route 40 trips are for

work purposes, 13 percent for school, and 25 percent for shopping. Sixty-two percent of the route's riders use the MBTA five or more days per week.

## SERVICE COVERAGE

### Overall Assessment

Route 40 essentially serves two markets: riders that use only the segment of the route along Washington Street, and those that use the segment of the route off of Washington Street to Georgetowne. These two groups are split nearly evenly, with 51 percent utilizing only the service along Washington, and 49 percent using the segment beyond Washington Street. For riders that travel only along Washington Street, Route 40 functions in the same manner as Route 34 or Route 34E local trips. These riders should show no preference between Route 34 or Route 40 and would be expected to board the first bus to arrive. Further, since there are three to four times as many Route 34 trips as Route 40 trips, this group of riders would most often use Route 34. The second group uses the route to and from Georgetowne and is only served by Route 40.

As a result of these characteristics, any changes made to Route 40 would have much more of an impact on riders from West Boundary Street and Georgetowne than riders along Washington Street. On this basis, Route 40 should be designed in terms of serving primarily Georgetowne riders, as is the case. For riders from Georgetowne, approximately 86 percent of all trips are to and from Forest Hills, and the route provides the most direct service possible between the two areas.

As mentioned above, headways on Route 40 were recently reduced from 30 minutes to 25 minutes throughout most of the day. These headway reductions were implemented by reducing cycle times from 60 minutes to 50 minutes to make more efficient use of two vehicles that were deployed. They were not made because of crowding problems: when ridechecked in the Spring of 1986, all trips with the exception of one AM peak trip and one school period trip operated below capacity. Although ridership has increased six percent since that time, the headway reductions have resulted in lower loads in all periods except the PM peak (where headways were increased and average peak loads had increased from 22 to 29 passengers).

As an alternative to the lower 25 minute headways, the additional 10 minutes that is available within the 60 minute cycle time could be used to extend service along the Stoney Brook Reservation "loop", or "figure 8", served by Route 33. As was discussed in Chapter 3, residents of that area, which is served by Route 33, would be better served by service to Forest Hills, but a rerouting of Route 33 to Forest Hills would not be feasible. However, an



extension of Route 40 could serve most of those same trips, and would be possible within existing vehicle levels by operating service at 30 minute headways with a 60 minute cycle time.

**Extension of Route 40 from Georgetowne to River Street via Alwin Street, Turtle Pond Parkway, Reservation Road and Smithfield Street**

An extension of Route 40 past Georgetowne could operate from Georgetowne Drive right onto Dedham Parkway, left on Alwin Road, straight onto Reservation Road, right onto River Street, right on Turtle Pond Parkway, and left back onto Alwin Road, where it would then retrace its route back to Forest Hills (see Figure 12-2). This alignment would deviate slightly from the loop operated by Route 33 in that it would operate fully around the outer part of the loop (Dedham Parkway and Turtle Pond Parkway between Georgetowne Drive and Smithfield Road). However, this should not adversely affect potential ridership since that part of the alignment is through the Stoney Brook Reservation and not through residential areas.

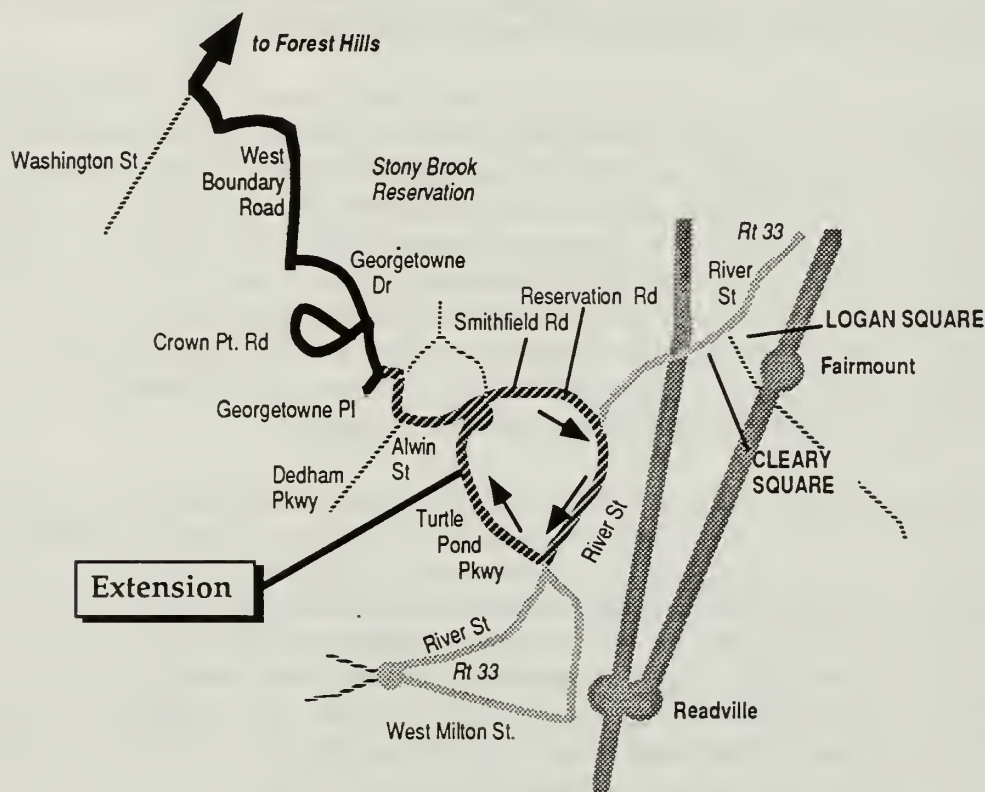
The most appropriate layover point would be the intersection of Alwin Road, Turtle Pond Parkway and Smithfield Road. However, before noontime, most ridership from the loop area<sup>51</sup> is inbound, while after that time, more is outbound. It is anticipated that this would also be the case with new ridership on Route 40. Therefore, in the morning (before 12:00 noon), buses should layover at that point prior to operating down Reservation Road. After noontime, buses should layover at that point after operating around Reservation Road, River Street and Turtle Pond Parkway. This arrangement would minimize the number of riders that would have to layover with the bus at the end/beginning of the line.

This alignment also assumes that Route 40 would continue to operate up and down Georgetowne Place, and around the loop to Margarita Drive and Crown Point Drive as is now the case. Continuing the loops would result in somewhat indirect service, but would be necessary in order to continue to provide convenient service to existing riders. At present, the most highly utilized stop on the route, other than Forest Hills, is the stop at the beginning/end of the line at the end of Georgetowne Place. It is possible that the reason for the high use at this stop is because it is the end of the line and is within walking distance of much of the Georgetowne complex. By walking to that stop, riders can wait on the bus instead of along the street. It is possible that if the end of the line is changed, these riders will redistribute themselves to other stops and the Georgetowne Place segment, which is a dead end, could then be eliminated, thereby making the route more direct. However, until that occurs, if it does, the route should continue to operate on Georgetowne Place.

---

<sup>51</sup>Based on Route 33 ridership patterns.

Figure 12-2  
Extension of Route 40 past Georgetowne



It is estimated that the extension would increase ridership by at least 85 trips per day, or approximately seven percent. Nearly all of this increase would be riders shifting from Route 33 in order to take advantage of more direct service to Forest Hills and downtown Boston. Currently on Route 33, there are 186 daily riders on the segment that would also be served by Route 40. Of these, 51 percent, or 95 daily riders, are making trips to and from downtown Boston. These 95 daily riders would be better served by the extension of Route 40 than they now are by Route 33, and would presumably shift to Route 40.

In addition to riders that would shift from Route 33, new transit riders would also be expected to be attracted by more convenient service. Existing transit service to downtown Boston via Route 33, the Mattapan High Speed Line, the Red Line, and for many trips, the Orange or Green Lines, involves two or more transfers and long travel times. This inconvenient service is presumably responsible for relatively low transit mode splits from this area to the Financial District and the Back Bay of 41 percent and nine percent, respectively. From most other sections of the SOUTHBus area, mode splits to

the Financial District are in the range of 50 to 70 percent, and to the Back Bay, the transit mode split usually exceeds 30 percent. Assuming that more direct service could increase mode splits to 50 percent and 30 percent, respectively, and factoring in non-work trips and trips attracted from outside of the immediate area,<sup>52</sup> an additional 35 passengers would be attracted by more direct service. In addition, although not estimated, new riders to the Fenway/Parker Hill and other areas of Boston would also be expected.

At the same time, a small decrease in existing ridership would be expected from returning headways to 30 minutes during the AM peak through school periods, and by increasing PM peak headways to 30 minutes. Throughout the day, up to 45 riders may be lost due to the higher headways. However, the combined overall impact of the extension, including the slightly longer headways, would be an increase of 85 riders per weekday on Route 40. Because the same number of vehicles and vehicle hours would be involved, there would be no impact on operating costs.

Estimated schedule statistics for the extension are shown in Figure 12-3. Variations 40.0 and 40.1 would operate along identical alignments, with the

Table 12-3  
Proposed Route 40 Schedule Statistics with Extension  
(All Time Figures in Minutes)

	Route 40.0			Route 40.1		
	3:00am- 6:59am	7:00am- 8:59am	9:00am- 11:59pm	12:00pm- 1:59pm	2:00pm- 5:59pm	6:00pm- 8:29pm
<u>Inbound</u>						
Run Time	--	28	23	20	21	19
Min Layover Time	--	4	3	3	3	4
<u>Outbound</u>						
Run Time	18	23	24	27	28	29
Min Layover Time	3	3	3	3	4	4
<u>Round Trip</u>						
Run Time	--	51	47	47	49	48
Min Layover Time	--	7	6	6	7	8
Optimum Cycle Time	--	58	53	53	56	56
<u>Proposed</u>						
Cycle Time	60	60	60	60	60	60
Recovery Time	na	9		13	11	12
Headways	30	30	30	30	30	30
Vehicles Required	2	2	2	2	2	2

<sup>52</sup>Fifty-two and seven percent, respectively, based on the characteristics of other Route 40 riders



only differences being the location of the layover, as described. Variation 40.1 would operate in the morning and layover before operating around the "Reservation" loop, while variation 40.1 would operate in the afternoon and layover after completing the loop. All times are based on Spring 1986 observed running times for Route 40 and the loop portion of Route 33.5 and 33.6, plus one minute for the segment between the end of Route 40 and the Reservation loop.<sup>53</sup>

## LEVEL OF SERVICE

### Existing Service

Route 40 service operates below capacity throughout the day. However, only two vehicles are deployed, so that 45 to 50 minute headways would be required to save one vehicle. The additional passenger wait time that would result from a doubling of headways would be small compared to vehicle savings during all periods (see Table 12-4). However, 50 minute headways would be much higher than desirable during peak periods, so that the use of only one vehicle should only be considered during the base and school periods. During these periods, one vehicle could be used to provide 45 minute base period headways and 50 minute school period headways. Due to very low ridership during those periods, each hour of vehicle savings could be gained at a cost of no more than 6.3 hours of additional passenger wait time.

### With Extension around Reservation Loop

With an extension around the Reservation Loop, existing 25 minute headways would need to be lengthened to 30 minutes to accommodate the extension. During the base and school periods, as with existing service, headways could also be lengthened further in order to save one vehicle. During these periods, this would require that headways be increased to 60 minutes, which as shown in Table 12-5, would still result in small increases in passenger wait time relative to the vehicle savings of 7.0 hours of additional wait time for each vehicle hour saved.

## RELIABILITY

A large number of AM peak and base period outbound trips were observed departing late, while a number of inbound trips were observed departing

---

<sup>53</sup>For more detailed running time information, see Technical Supplement 2.

Table 12-4  
 Passenger and Service Impacts of Longer Route 40 Headways  
 (Excluding Riders Who Only Use Route 40 Along Washington Street)<sup>54</sup>

	Early <u>AM</u>	AM <u>Peak</u>	<u>Base</u>	<u>School</u>	PM <u>Peak</u>	<u>Evening</u>	<u>Total</u>
<u>Headways</u>							
Original Headways (min)	25	25	25	25	25	25	
New Headways (min)	50	50	45	50	50	50	
<u>Passenger/Service Impacts</u>							
Original Ridership	1	140	227	86	97	16	567
Projected Demand	1	103	174	63	71	12	424
Increase/Decrease	0	-37	-53	-23	-26	-4	-143
Inc in Pax Wait Time (hrs)	0.2	21.4	29.0	13.2	14.8	2.4	81.0
Vehicle Hour Change	-0.2	-2.1	-4.9	-2.1	-2.1	-1.0	-12.4
<i>Pax Wait Time/ Vehicle Hour Change</i>	-0.7	-10.3	-5.9	-6.3	-7.1	-2.3	

Table 12-5  
 Passenger and Service Impacts of Longer Route 40 Headways  
 in Conjunction with an Extension around the Reservation Loop  
 (Excluding Riders Who Only Use Route 40 Along Washington Street)

	<u>Base</u>	<u>School</u>
<u>Headways</u>		
Original Headways	25	25
New Headways	60	60
<u>Passenger /Service Impacts</u>		
Original Ridership	227	86
Projected Demand	155	59
Increase/Decrease	-72	-27
Increase in Pax Wait Time (hrs)	45.1	17.1
Vehicle Hour Change	-6.4	-2.4
<i>Pax Wait Time/ Vehicle Hour Change</i>	-7.0	-7.0

<sup>54</sup>Riders who only use Route 40 along Washington are also served by Route 34. Due to the high level of service on Route 34, these cutbacks on Route 40 would not result in a perceptible decrease in overall service levels along Washington Street.

early during the same periods. In total, five of fifteen outbound trips during those periods left three or more minutes late, and four of 14 inbound trips left two or more minutes early. The cause of these off-schedule departures could not be determined. In the AM peak, all off-schedules occurred on one run, but this was not the case during the base period. Also, actual outbound trip times were significantly longer than scheduled during these periods (see Table 12-6), but not to the extent that buses arrived at the end of the line after the scheduled departure time of the next trip. Therefore, off-schedule departures were not caused by scheduling problems.

Table 12-6  
Route 40 Schedule Statistics  
(All Figures in Minutes)

	3:00am- 6:59am	7:00am- 8:59pm	9:00am- 1:59pm	2:00pm- 5:59pm	6:00pm- 8:29pm
<u>Inbound</u>					
Scheduled Run Time	--	20	16	16	15
Observed Run Time	--	21.7	16.5	17.8	16.0
STD of Obs Run Times	--	3.2	2.2	1.7	3.6
<u>Outbound</u>					
Scheduled Run Time	15	15	15	19	15
Observed Run Time	15.0	19.7	20.8	22.4	--
STD of Obs Run Times	--	1.7	2.3	3.3	--
<u>Round Trip</u>					
Scheduled Cycle Time	--	60	60	60	60
Sched RT Run Time	--	35	31	35	30
Observed RT Run Time	--	41	37	40	--
Scheduled Recovery Time	--	25	14	25	30
Observed Recovery Time	--	19	8	20	--
STD * 1.5	--	7	7	8	--

Although Spring 1986 outbound trip times were longer than scheduled, there was still a large amount of excess time within the 60 minute cycle time that operated in the Spring of 1986. The change to 25 minute headways and a 50 minute cycle time in the Spring of 1987 corrects that situation and utilizes the two buses deployed on the route more efficiently.

Since those changes were made, data on Route 40's on-time performance has not been collected. However, based on observed 1986 running times and current schedules, it appears that additional refinements could be made in the PM peak to better insure reliable service. With the current 50 minute cycle time, runs are scheduled so that inbound and outbound trips are spaced evenly apart at 25 minute intervals. For most of the day, the allotted 25



minutes is more than sufficient to meet running time and layover time requirements. In the PM peak, however, slightly more time is needed in the outbound direction. Outbound running times during that period average between 22 and 23 minutes, and two to three minutes of recovery time is needed. Therefore, inbound trips should be scheduled to begin at least 26 minutes after the preceding outbound trip. Inbound times could be decreased slightly to accommodate the additional outbound time within the 50 minute cycle time.



---

## 13. Route 50

---

*Route 50: Cleary Square - Forest Hills via Clarendon Hills*

### ROUTE PROFILE

Route 50 operates between Cleary Square and Forest Hills via Clarendon Hills and Roslindale Square largely along West Street, Metropolitan Avenue, and Washington Street (see Figure 13-1). Connections can be made with the Orange Line and Routes 16, 21, 39, and 41 at Forest Hills, to Routes 30, 35, 36, 37 and 51 at Roslindale Square, to Route 34 along Washington Street, and to Routes 32 and 33 in Cleary Square. Connections can also be made to commuter rail at the Hyde Park station on the Fairmount Line, at Roslindale Village on the Needham Line, and at Forest Hills.

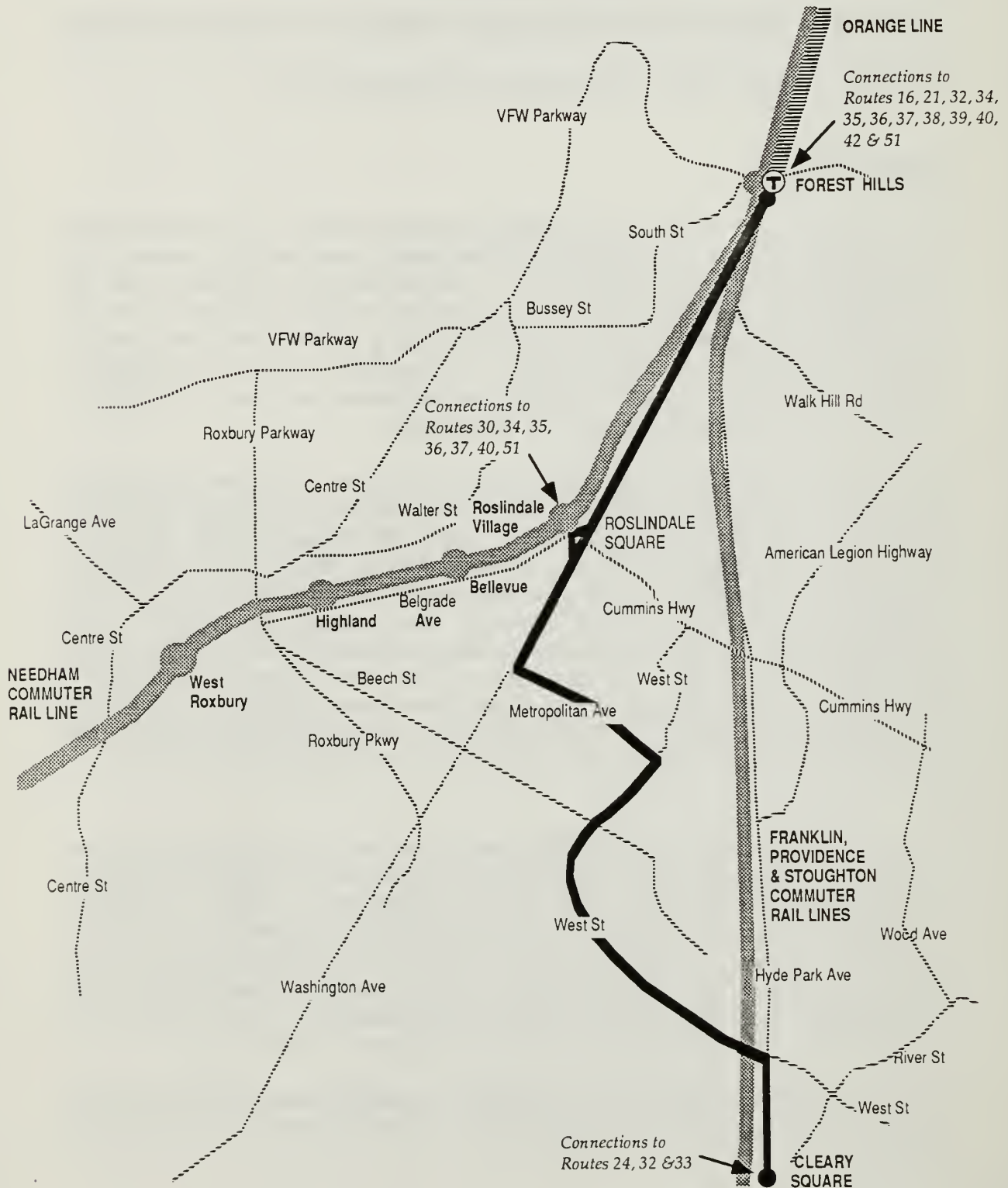
Service is operated between 6:25 am and 7:15 pm, with headways of 20 minutes in the AM peak, school and PM peak periods, and 20 to 60 minutes during the base period (see Table 13-1). Since the Spring of 1986, one round trip has been eliminated (9:00 am outbound; 9:30 am inbound), but otherwise schedules have remained relatively unchanged. Ridership in the spring of 1986 was approximately 1,170 trips per day, among the lowest in the SOUTHBus corridor (but essentially the same as Routes 33 and 40, and higher than Route 38). Since the opening of the new Orange Line, MBTA pointchecks indicate that ridership to and from Forest Hills has increased by approximately 20 percent, or 175 trips per day, through the Fall of 1987. This would increase total ridership by 15 percent to 1,345 trips per day (see Table 13-2).

In the Spring of 1986, some crowding was observed in the inbound direction during the AM peak. Average peak loads for the period were 43 passengers, and for the peak half-hour, they were 62 passengers. With a 15 percent ridership increase, average peak loads have likely increased to 49 for the period, or 123 percent of seated capacity, and 71 in the peak half-hour, or 178 percent of seated capacity. During other periods, including the PM peak, peak loads were low in the Spring of 1986 at 23 passengers or less. With a 15 percent ridership increase, these loads will remain low, at 26 or less.

As with other Forest Hills routes, ridership is peaked towards Forest Hills in the AM peak and away from Forest Hills in the PM peak. In the Spring of



Figure 13-1  
Route 50: Cleary Square - Forest Hills



**Table 13-1**  
**Route 50 Weekday Service Statistics**

Hours of Operation (Spring 1986 and Fall 1987): 6:25 am - 7:15 pm

	Average One-Way Length	One- Way Trips	<u>Avg Headway (Min-Peak Dir)</u>						<u>All Day</u>	
			<u>EA</u>	<u>AM</u>	<u>Base</u>	<u>Sch</u>	<u>PM</u>	<u>Eve</u>	<u>VSM</u>	<u>VSH</u>
<i>Spring 1986</i>	4.2	60	--	20	40	20	20	25	252.0	27.8
<i>Fall 1987</i>	4.2	58	--	20	46	20	20	25	243.6	27.0
<i>Change</i>	--	-3%	--	--	+15%	--	--	--	-3%	-3%

**Table 13-2**  
**Route 50 Ridership and Productivity Statistics**

		<u>Boardings/VSM</u>							<u>Boardings/ VSH</u>
	<u>Weekday Boardings</u>	<u>Early</u>	<u>AM</u>			<u>PM</u>		<u>All</u>	
		<u>AM</u>	<u>Peak</u>	<u>Base</u>	<u>Sch</u>	<u>Peak</u>	<u>Eve</u>	<u>Day</u>	<u>All Day</u>
<i>Spring 1986</i>	1,180	0.4	6.1	4.9	5.0	3.6	1.4	4.6	44.7
<i>Fall 1987</i>	1,345							5.5	49.8
<i>Change</i>	+15%							+20%	+11%

Percent of passengers 65 or older (Spring 1986): 16%

Percent without a car available for trip (Spring 1986): 72%

Spring 1986 peak load points: Inbound: Washington St @ Aldwin Rd  
Outbound: Roslindale Square

1986, 56 percent of all ridership was to or from Forest Hills, with 35 percent of all passengers transferring to the Orange Line. Most other trips were to or from locations along Washington Street between Roslindale Square and Forest Hills (including transfers to other routes at Roslindale Square). In addition to Orange Line transfers, a large number of Route 50 riders also transfer to other bus routes. Most bus transfers are to Route 39 (160 per day), followed by Route 32 (45), Routes 34 and 36 (35 each), Route 35 (20), Route 37 (15), Routes 16, 33 and 51 (10 per route), and Routes 21 and 42 (5 each).

A large majority (92 percent) of all passengers are residents of Roslindale or Hyde Park. For work trips, 58 percent are from Roslindale and 34 percent are from Hyde Park. Destination towns are more dispersed, with 50 percent of

Route 50's riders working in downtown Boston, 13 percent in Hyde Park, and 12 percent in Roslindale. Most of these riders walk to the route at the outer end (87 percent), while at the inner end, only 35 percent walk to and from the bus. As mentioned above, 35 percent transfer to the Orange Line at the inner end, and 26 percent make a transfer with another bus.

Route 50 riders have near average levels of transit dependency for the area. Fifteen percent of the route's riders are 17 or younger, and 16 percent are 65 or older. Thirty-six percent are from households with annual incomes of \$15,000 or less, and 72 percent did not have a car available for their trip. Less than half of all trips are for work purposes (46 percent), while 20 percent are for shopping and 15 percent are for school. Seventy-two percent use the MBTA five or more days per week.

### SERVICE COVERAGE

The outer end of Route 50 (below Washington Street) is primarily residential, and most of the residents of this area work outside the Route 50 service area in Downtown Boston or the Fenway/Parker Hill area. Only 55 of the residents of Route 50's service area work in an area directly accessible by Route 50. Thus, most of the riders of Route 50 must transfer with another MBTA bus or the Orange Line (at Forest Hills) to reach their final destinations. When surveyed in the Spring of 1986, for all trip purposes, only 35 percent of the route's riders walked to their final destinations at the inner end of the route, while 35 percent transferred to the Orange Line and 26 percent transferred to/from another bus. At the outer end of the route, 87 percent of the riders walked to/from the bus.

The major purpose of Route 50 is to serve trips made between Hyde Park (Clarendon Hills) and Roslindale (below Washington Street) and Forest Hills. Trips made along Washington Street between Metropolitan Avenue and Forest Hills are served by five other routes (34, 35, 36, 37 and 40), and very few of the trips made on Route 50 (15%) are of this type. Thus, existing service was examined from the perspective of service to riders boarding or alighting below Washington Street. Most of these riders are destined toward Downtown Boston (38%) or Roslindale (27%), and the current alignment provides direct service between these areas.

Modifications could be made to Route 50 to improve service to residents of the service areas of the outer ends of Routes 24 and 33 by extending Route 50 to the outer end of these routes. However, as was discussed in Chapter 3, these extensions of Route 50 along the outer end of Route 24 or Route 33 would inconvenience more riders than they would benefit, and operating cost savings would be small.



Other than extensions along the outer ends of Route 24 or Route 33, no other extensions or realignments appeared worth pursuing. Route 50 is the only route that operates in most of its service area so that a major realignment to another area to attract more riders would not be possible without leaving the Clarendon Hills and Metropolitan Avenue areas unserved.

West Street is bounded by the George Wright Golf Course on one side of the street, with the residences the route serves on the other side of the street. As would be expected, not much ridership is attracted by the golf course. Therefore, an alternate alignment through the middle of Clarendon Hills, away from the golf course and closer to more residences, would presumably serve more trips. However, there are no reasonably direct routes through that area, leaving West Street as the best possible alignment.

As a result of these characteristics, Route 50 should continue to operate along its existing alignment. As discussed in the following sections, potential changes to the route focus on schedule changes to better balance service levels with ridership levels and to improve on-time performance.

### LEVEL OF SERVICE

Route 50 operates with excess capacity throughout the day with the exception of the AM peak, where the maximum load of the first trip of the day is 144 percent of seated capacity. While this load is slightly above the maximum standard of 140 percent, the maximum load is reached only several stops before Forest Hills. Thus, crowding on the bus is of short duration and does not require an additional trip.

Given current loads, headways could theoretically be increased during the base, school, and PM peak periods without causing crowding. However, as described below, given the cycle times, existing vehicle deployment and that all Route 50 trips are interlined with Route 51 trips, actions to attain cost savings would require large headway increases and greatly inconvenience existing riders during all periods except the school period. Therefore, because the current headways are already long during the base and PM peak periods, they should be maintained as policy headways rather than demand-based.

**Base** Two vehicles are deployed during the base period to provide service on Routes 50 and 51 at 60 minute headways. Peak loads are low, averaging 12 throughout the period, but to save one vehicle, both routes would have to be operated at 110 minute (1 hour and 50 minute) headways. This headway would nearly double the maximum policy headway, and would result in a loss of 315 riders. It would also increase wait time for remaining passengers by 315 hours, or 91 hours for each of the 6.5 hours of vehicle time that would be saved.

**School** Six vehicles are currently deployed during the school period to provide 20 minute headways on both routes. One vehicle could be saved by operating both routes at 23 minute headways. The headway increase would result in a loss of 23 riders and increase average peak loads to 23 passengers on Route 50 and 24 on Route 51. It would also increase wait time for remaining passengers by 8.8 hours, or 5.9 hours for each of the 1.5 hours of vehicle time that would be saved. This change would result in cost savings of \$18,800 per year.

Two vehicles could be saved by operating both routes at 28 minute headways. This headway increase would result in a loss of 54 riders and would increase passenger wait time by 21.3 hours, or 6.4 hours for each of the 3.3 vehicle hours saved. Additionally, 28 minute headways would result in savings of \$37,600 per year over existing operations. Thirty minute headways could also be provided with four vehicles, resulting in a loss of 63 passengers and an increase of 7.4 hours of passenger wait time for each of the 3.5 vehicle hours saved. Cost savings would be similar to those for 28 minute headways.

**PM Peak** Currently six vehicles are used on Routes 50 and 51 to provide service at 20 minute headways during the PM Peak and until 6:50 pm. One vehicle could be saved by operating both routes at 22 minute headways. The increase in headway would result in a loss of 62 riders and increase average peak loads to 23 passengers on Route 50 and 40 on Route 51. It would also increase wait time for remaining passengers by 22.9 hours, or 17.6 hours for each of the 1.3 hours of vehicle time that would be saved.

## **RELIABILITY**

Overall on-time performance for Route 50 was 87 percent, with eight percent of the trips departing greater than two minutes early and five percent departing three or more minutes late. The source of these off-schedule departures could not be determined. The five early departures occurred during the base and school periods. All three late departures occurred during the base period, where observed run times are slightly higher than those scheduled. However, enough layover/recovery time is provided to prevent succeeding trips from departing late. Thus, the late departures are not caused by the schedule.

However, many of the observed run times differ from scheduled run times. Although the schedule provides enough layover/recovery time to compensate for trips which are not adequately scheduled, some improvements in running time performance along the route could be

accomplished by adjusting schedule times to reflect actual times. As shown in Table 13-3, improvements could be made during all schedule periods. These changes would not affect vehicle deployment levels.

**Table 13-3**  
**Route 50 Schedule Statistics**  
**(All Figures in Minutes)**

---

	<u>3:00am- 6:59am</u>	<u>7:00am- 8:59am</u>	<u>9:00am- 3:29pm</u>	<u>3:30pm- 5:59pm</u>	<u>6:00pm- 8:29pm</u>
<u><i>Inbound</i></u>					
Scheduled Run Time	16	19	18	19	17
Observed Run Time	25	22	20	19	16
STD of Obs Run Times	--	4.7	3.2	1.9	1.5
<u><i>Outbound</i></u>					
Scheduled Run Time	16	20	18	19	18
Observed Run Time	16	19	19	23	22
STD of Obs Run Times	2.1	3.7	3.1	1.8	2.5
<u><i>Round Trip</i></u>					
Scheduled Cycle Time	50	60	50	60	60
Sched RT Run Time	32	39	36	38	35
Obs RT Run Time	41	42	39	42	38
Sch Recovery Time	18	21	14	22	25
Obs Recovery Time	9	18	11	18	22
STD * 1.5	--	13	9	6	6
<i>Optimal Cycle Time</i>	49 <sup>55</sup>	55	48	48	44

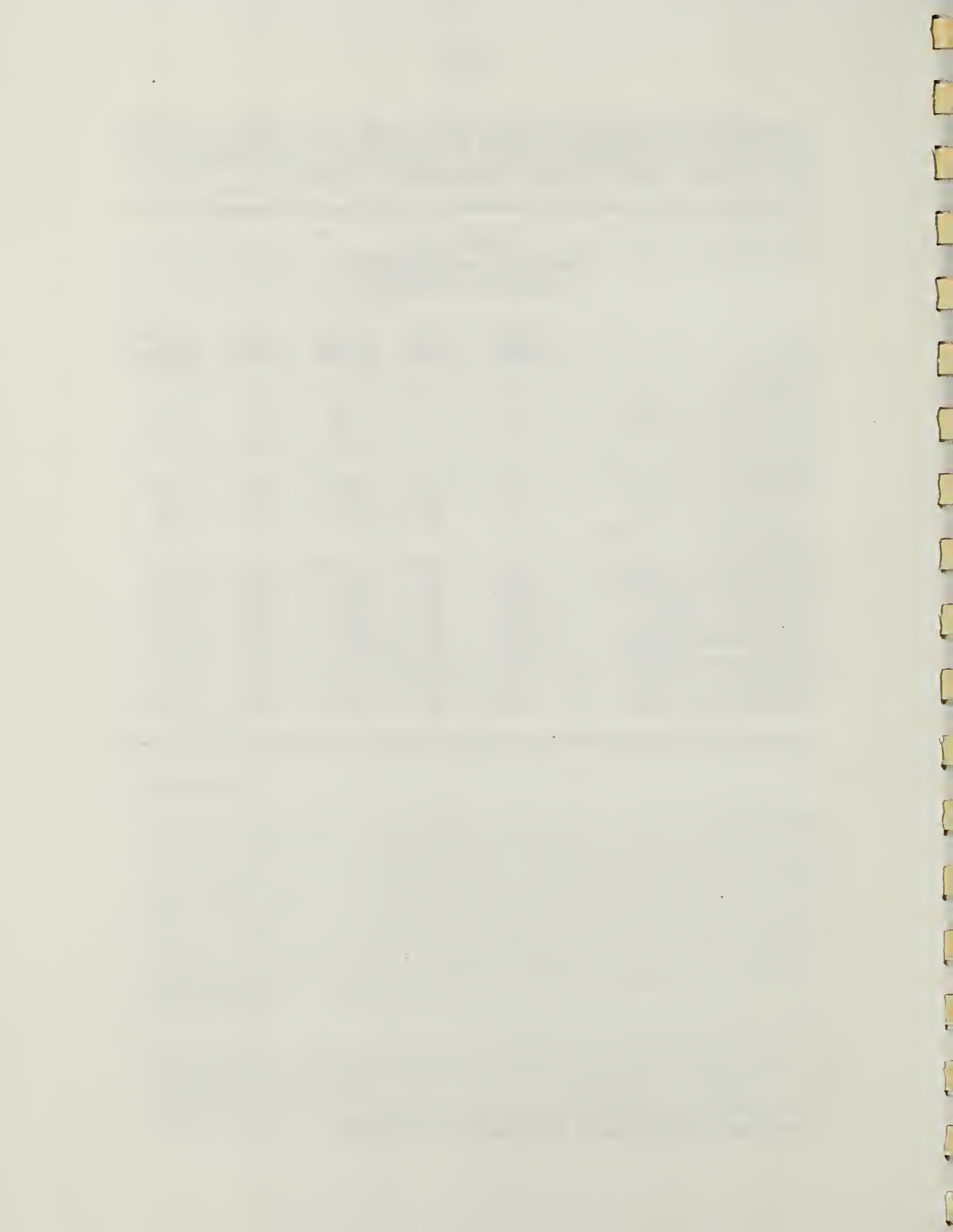
---



---

<sup>55</sup>Includes recovery time at 20 percent of running time.





---

## 14. Other Issues

---

- *New Service between West Roxbury, Hancock Village and Chestnut Hill*
- *Holding Buses at Forest Hills Until Orange Line Trains Have Unloaded*
- *Providing Additional Weekend and Evening Service* •

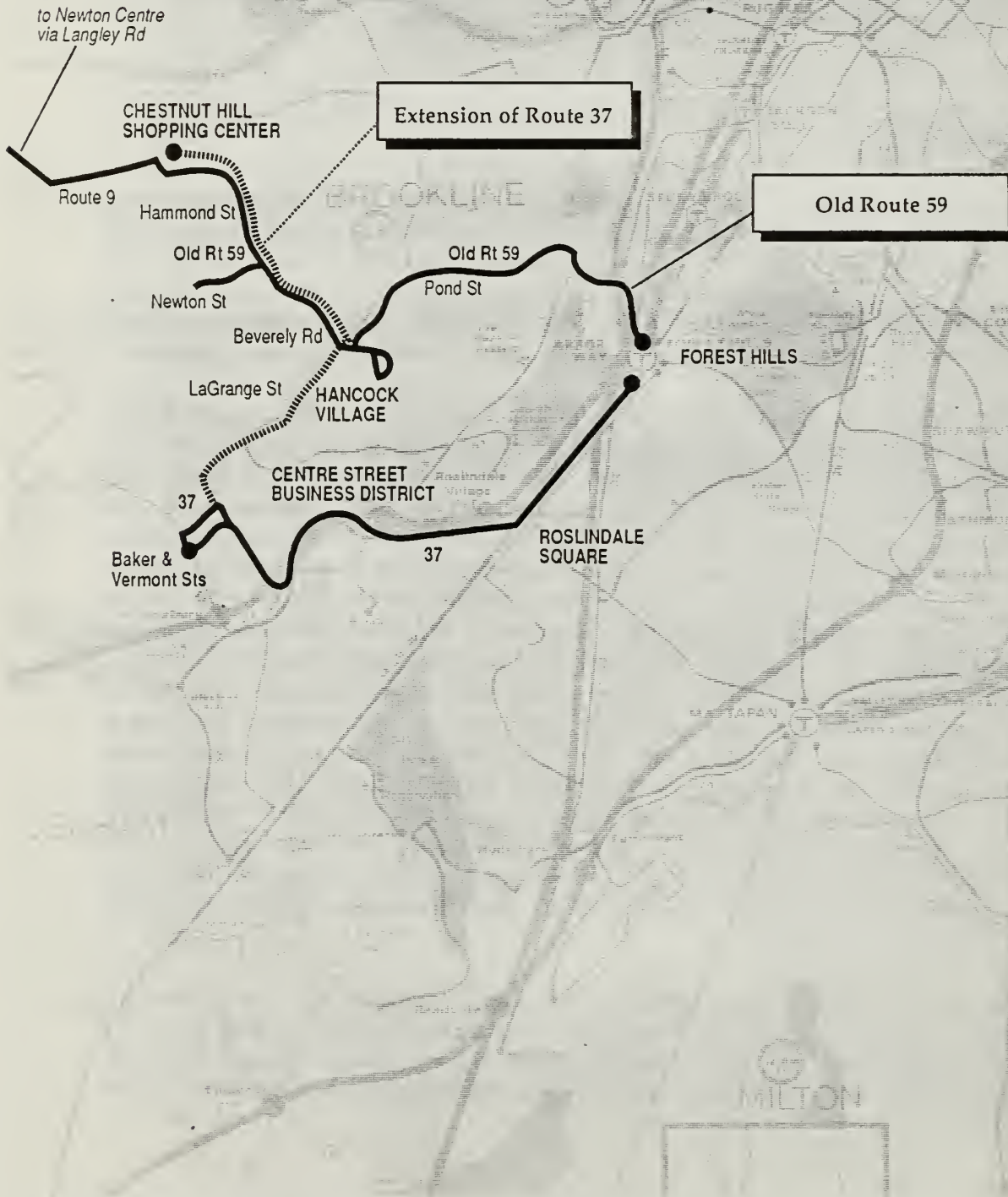
### NEW SERVICE BETWEEN WEST ROXBURY, HANCOCK VILLAGE AND CHESTNUT HILL

Requests have been made to the MBTA for direct bus service between Hancock Village in Brookline and the Chestnut Hill Shopping Center, and between West Roxbury's Centre Street business district and the Chestnut Hill Shopping Center. Presently, Hancock Village is accessible to Chestnut Hill through a transfer between Route 51 and Route 60. Trips from the Centre Street business district to Chestnut Hill can only be made with two transfers.

With the exception of Route 51, most of the area between the Centre Street Business District, Hancock Village and Chestnut Hill is not now served by transit. This is due primarily to the socio-economic and land use characteristics of the area and historic low utilization of bus service. In general, the area consists of affluent Newton and Brookline neighborhoods, numerous parks, golf clubs and cemeteries—features that are not conducive to high transit ridership. This is evidenced by the low ridership on the route that operated in the area until 1979. That route, Route 59 (different from the current Route 59), operated between Forest Hills and Chestnut Hill via Hancock Village. At the time the route was discontinued, total daily ridership was only 470 trips per day. For most of its existence, that route operated between Forest Hills and the Chestnut Hill Shopping Center along Centre Street, the Arborway, Pond Street, Beverly Road, and Hammond Street. The route also included deviations along Allandale Street and Newton Road (see Figure 14-1). A year prior to its discontinuance, it was extended to Newton Centre in a final attempt to attract additional ridership (that extension did increase ridership by 27 percent, increasing daily ridership from 370 per day to 470).

Since the old Route 59 was discontinued, there have not been large enough changes in the area to indicate that transit ridership would now be significantly higher. In most of the area (with the exception of along Route 9), development, population, and employment have remained relatively stable

**Figure 14-1**  
**Centre Street Business District - Chestnut Hill Alternatives**





over the last ten years. Between 1980 and 1990, population in census tracts through which the route would pass is projected to decrease by 390 persons, or 1.5 percent. Employment is projected to increase by 1,420 jobs, or 15 percent, but most of the new jobs will be created along Route 9 in developments such as the Atrium Mall, which may not be directly served by the new route. However, assuming that ridership on reinstituted service would be 15 percent higher than it was when it was discontinued (corresponding to the 15 percent increase in employment), ridership would still be only 540 trips per day with service to Newton Centre, or 430 trips per day with service only as far as the Chestnut Hill Shopping Center. For comparison purposes, the lowest ridership on any of the SOUTHBus routes is 1,210 trips per day. However, ridership would be comparable to the worst performing suburban service in the WESTBus corridor (Route 56, Newton Corner - Waltham Highlands, and Route 58, Newton Corner - Auburndale), which includes some comparable areas. The cost of reinstating the old route at its prior service level (50 minute headways during peak periods and 90 minutes mid-day), including service to Newton Centre, but without Saturday service, would be approximately \$169,700 per year. The net cost per new passenger (assuming an average fare of 37 cents) would be \$0.89.

As an alternative to reinstating old Route 59, it would be possible to extend Route 37 to Chestnut Hill through Hancock Village (see Figure 14-1). However, this extension would also be lightly utilized. Between Hancock Village and Chestnut Hill, an extension of Route 37 would have to follow the same alignment as the old Route 59 because no other practical alignments exist.<sup>56</sup> Ridership on that alignment of old Route 59 was relatively low, at only 165 ons and offs per day; it is anticipated that the extension would attract a similar level of ridership along that segment.

New connections would also be provided between West Roxbury and the Chestnut Hill Shopping Center, but it is difficult to predict how much ridership would be attracted because transit ridership to shopping areas often varies by a large degree. For example, ridership to and from the Chestnut Hill Shopping Center on Route 60 is 205 trips per day and on old Route 59 was 150 trips per day; ridership to the Dedham Mall from West Roxbury on Route 35 is 525 trips per day, but on Route 52 is only 120 trips per day. Some of these differences can be explained by differences in levels of service provided on the three routes, distances traveled, and the areas served. Routes 35 and 60 provide much higher levels of service than Route 52 or old Route 59 (65 trips per day on Route 35 and 90 trips per day on Route 60, versus only 39 trips on Route 52 and 32 trips on old Route 59). Routes 35 and 60 also serve areas that are much more densely populated and have higher levels of transit dependency than Route 52 or old Route 59.

---

<sup>56</sup>The only other alternative would be Hammond Pond Parkway, which would serve less development than the Hammond Street alignment.

Using Route 35 mall ridership from West Roxbury as a base, but adjusting for headway and service span differences, ridership from West Roxbury to the Chestnut Hill Shopping Mall would be as high as 300 trips per day. However, the distance from West Roxbury to Chestnut Hill is much longer than the distance to the Dedham Mall, and stores in Chestnut Hill are generally more expensive than those at the Dedham Mall. Considering the extra distance and that Chestnut Hill shopping areas attract more affluent patrons than typically use local bus service, it is doubtful that bus service would carry a comparable number of trips to Chestnut Hill as to the Dedham Mall, so that actual ridership would be significantly lower. Using Route 60 as a base, and making the same adjustments for headway differences and span of service, ridership would be only 135 trips per day.

In addition to trips from West Roxbury to Chestnut Hill shopping areas, connections would also be possible to Newton Centre. Judging from the impact of the extension of old Route 59, which increased ridership by 27 percent, ridership on service operating to Newton Centre would be 27 percent higher than if it terminated at the Chestnut Hill Shopping Center. At a maximum, this would amount to 80 trips per day (trips to Newton Centre were already included in the ridership figures between Hancock Village and Chestnut Hill). Using the lower figure as a base, ridership beyond Route 9 would be 35 trips per day.

In total, a Route 37 extension to Newton Centre via Hancock Village and Chestnut Hill would attract a maximum of 545 trips per day, assuming that demand from West Roxbury to Chestnut Hill shopping areas is as high as to the Dedham Mall. More likely, this would not be the case, and ridership on the extension would be closer to 335 trips per day.

If every other Route 37 weekday trip were extended (40 trips per weekday) to provide a level of service roughly equivalent to that on the old Route 59, operating costs would increase by \$160,200 per year. The net cost per new passenger with an extension would be between \$0.81 and \$1.54 (compared to \$0.89 on a reinstated old Route 52 and an average of \$0.42 on existing SOUTHBus service [see also Table 14-1]).

#### HOLDING BUSES AT FOREST HILLS UNTIL TRAINS HAVE UNLOADED

Riders transferring from the Orange Line to buses at Forest Hills have complained that buses often depart just as transferring passengers are exiting from the station and before they have had time to complete their transfer. This occurs because bus drivers have no way of knowing when trains arrive at the station or when passengers are about to exit from the station.

Table 14-1  
Ridership and Cost Characteristics of Chestnut Hill Service

	<u>Ridership</u>	<u>Operating Cost</u>	<u>Net Cost/ Pax Trip</u>
Old Route 59	540	\$169,700	\$0.89
Extended Route 37	355-545	\$160,200	\$0.81-\$1.54
SOUTHBus Average			\$0.42

In the San Francisco Bay Area, this problem was addressed by AC Transit, an East Bay bus operator, and BART, the rail transit operator, by installing beacons on the bus platforms that flash as trains arrive at the station. Trains entering the station trigger a sensor in the track that turns on the flashing beacon. The beacon flashes for one minute before the train arrives at the station, and then for two minutes afterwards, which is long enough for passengers to complete the transfer. If buses are otherwise on-time, departures are delayed for the up to three minutes that the beacon is flashing. If a bus is already three or more minutes behind schedule, it does not wait. In cases where departures are delayed for up to three minutes, the extra time is made up as part of the regularly scheduled layover time at the end of the route. (AC Transit did not increase cycle times as a result of the program, nor have cumulative delays occurred.)

A similar program should also be feasible at Forest Hills (and at other stations with large numbers of connecting bus routes). However, in this area, since the Orange Line operates at much shorter headways than BART service<sup>57</sup> and buses are not scheduled to meet specific trains (as is the case at those BART stations), it would not be necessary or practical for a beacon to start flashing before the train got to the station—if it did, and trains started bunching together towards Forest Hills, the beacon would never go off. Instead, beacons could be programmed only to start flashing after a train has arrived at the station. This would allow passengers from that train to make their transfer, improving service for those passengers. At the same time, it would provide enough time for buses to depart before the next train arrives. This would avoid the public perception of poorly scheduled and/or operated service that can occur when transfers are just missed.

---

<sup>57</sup>7.5 to 15 minutes on individual lines in the East Bay during peak periods.



### ADDITIONAL WEEKEND AND EVENING SERVICE

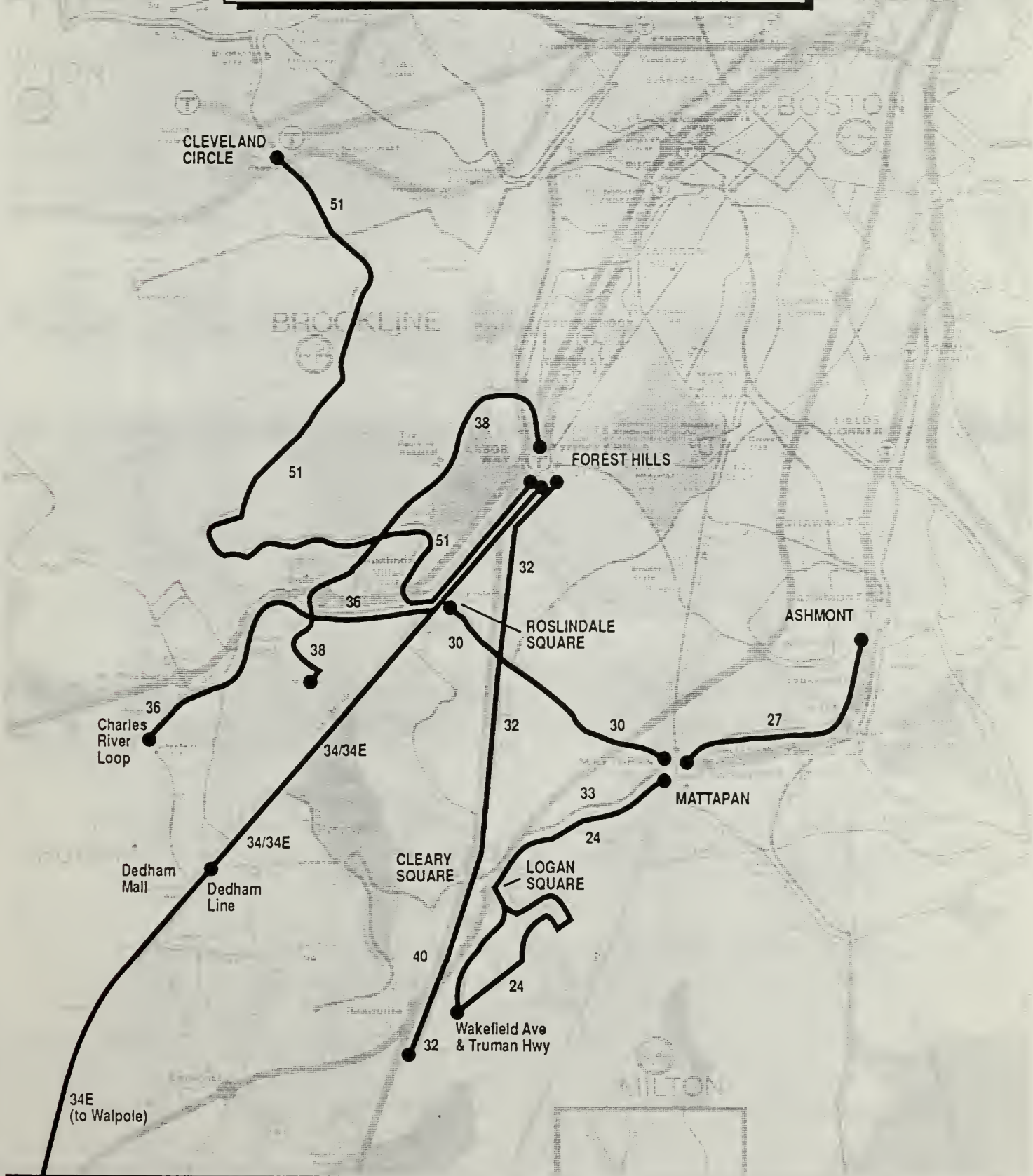
At the BTD's community transit workshops, SOUTHBus area residents expressed a desire for more evening and weekend service, particularly on Routes 36, 38, 50 and 51. As shown in Table 14-2, evening and Sunday service is already provided on two of those routes (Routes 36 and 38), so the reasons for those two routes being singled out is unclear. However, based on general concerns, expanded evening and Sunday service was examined for the corridor as a whole.

**Table 14-2**  
**Evening and Weekend Service Provided on SOUTHBus Routes**  
**(Spring 1988)**

	<u>Evening</u>	<u>Saturday</u>	<u>Sunday</u>
Route 24	until 1:04 am	5:50 am - 1:04 am	9:08 am - 9:30 pm
Route 27	until 1:04 am	5:15 am - 1:04 am	9:30 am - 8:45 pm
Route 30	until 12:40 am	5:27 am - 12:40 am	9:45 am - 8:57 pm
Route 32	until 1:26 am	5:05 am - 1:22 am	5:52 am - 1:05 pm
Route 33	until 7:11 pm	6:25 am - 6:45 pm	none
Route 34	until 1:31 am	4:40 am - 1:31 am	6:15 am - 1:31 am
Route 35	until 9:05 pm	5:20 am - 9:05 pm	9:45 am - 6:15 pm
Route 36	until 1:05 am	4:37 am - 1:05 am	5:30 am - 1:05 pm
Route 37	until 7:45 pm	5:30 am - 7:40 pm	none
Route 38	until 11:13 am	5:42 am - 11:13 am	10:00 am - 7:00 pm
Route 40	until 6:55 pm	6:00 am - 6:40 pm	none
Route 50	until 7:15 pm	6:25 am - 6:50 pm	none
Route 51	until 10:00 pm	6:15 am - 10:00 pm	none

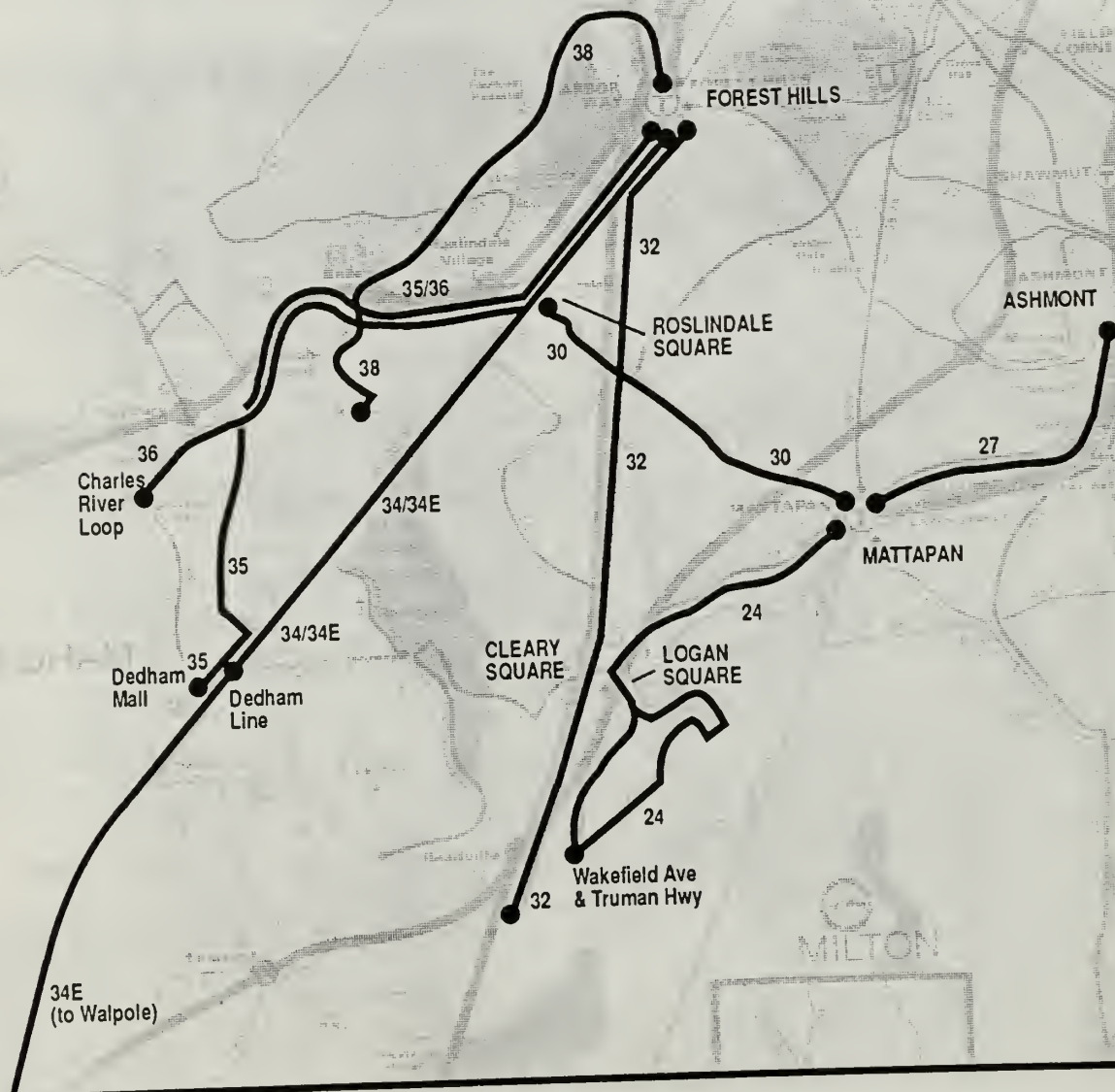
At present, evening service is provided on eight of the 13 routes until at least 10:00 pm (see Figure 14-2) and on five routes until after midnight. Saturday service is provided on all routes and Sunday service is provided on eight routes (see Figure 14-3). In general, but with significant exceptions, the routes with the heaviest weekday ridership also have late night and Sunday service. The routes without evening service past 8:00 pm (Routes 33, 37, 40 and 50) or Sunday service (Routes 33, 37, 40, 50, and 51) are among the most lightly utilized routes, or are in areas with other service available. (The exceptions are evening and Sunday service on Routes 27 and 38, which have much lower ridership than any of the routes without late night or Sunday service.) The same general relationship holds true when Saturday and Sunday service is compared—routes without Sunday service are generally those with the lightest Saturday ridership levels. Again, exceptions are Routes 27 and 38, and in this case, also Route 24, all of which have Sunday service but very low Saturday ridership.

**Figure 14-2**  
**Routes with Evening Service until 10:00 pm or Later**





**Figure 14-3**  
**Routes with Sunday Service**





### Additional Evening Service

Rather than attempting to determine the relative merits of additional service on individual routes, the approach was taken that service should be distributed to provide maximum service coverage. In this respect, two service changes discussed in previous chapters would significantly improve evening service:

- Routes 24 and 33: Rather than operating evening service only on Route 24, operate both routes at 60 minute headways and alternate trips. (Also extend both routes to Ashmont, replacing Route 27.) As discussed in Chapter 4, this change could be implemented with no change in vehicle requirements and essentially no change in operating costs.
- Route 35 and 36: After 9:00 pm, rather than operating service only on Route 36, operate both routes at 60 minute headways and alternate trips. As discussed in Chapter 9, this change could also be implemented without any impact on vehicle requirements or operating costs.

The additional service on Routes 33 and 35 would be provided by shifting service from other routes. This is possible because each route pair shares a trunk alignment, and while 30 minute headways are needed along the trunks, they are not needed along the outer ends. Therefore, instead of concentrating all service on only one route in each pair, service could be split between each to provide better service coverage. These changes would reduce the number of routes without evening service until at least 10:00 pm to three: Routes 37, 40, and 50.

On Route 37, it would not be cost effective to provide additional service. Over 62 percent of Route 37's ridership is exclusively on the trunk portion also served by Routes 35 and 36. Therefore, evening service on Route 37 would draw most of its ridership from existing service on Routes 35 and 36. Further, since 60 minute headways are recommended for Routes 35 and 36, it would not be possible to make service decreases on those routes to offset ridership losses on those routes, or the cost increase associated with adding service to Route 37. Also, the segment of Route 37 not served by Routes 35 and 36 is within approximately two-thirds of a mile, or less than 15 minutes walking distance, of those other two routes.

The situation with Route 40 is similar to that of Route 37. On this route, ridership is split between two markets—trips made only along Washington Street, and trips to and from the Georgetowne complex. Trips made only along Washington Street are served during the evening by Route 34. If evening service was provided on Route 33, Georgetowne trips could be served by that route. Service would be less convenient because Route 33 does not operate directly to Georgetowne as does Route 40, and it would operate to

Ashmont instead of Forest Hills. However, service would be within one-quarter of a mile of much of Georgetowne, and access to Forest Hills would be possible with a transfer with Route 30 if that route were extended to Forest Hills as discussed in Chapter 5.

Most of the area served by Route 50, except for the middle segment along Poplar and West Streets, is within one-half mile of Routes 24, 32, and 34. During the day, ridership along this middle segment accounts for 34 percent of Route 50's ridership, or 455 trips per weekday (32 percent on Saturday). On SOUTHBus routes that now have evening service, evening ridership accounts for seven to 13 percent of total ridership (on Routes 38 and 36, respectively). This would indicate that total evening ridership on Route 50 would be between 100 and 200 trips. However, only 34 percent, or 35 to 70 of these riders would not have access to another route, so that the total number of persons that would be given new access to service would be relatively small. Assuming hourly service until 10:00 pm, three new daily round trips would be added at a cost of \$25,700 per year, or \$0.17 to \$0.68 per passenger trip. The cost per new trip would be significantly higher at \$1.23 to \$2.60 per passenger trip. Considering that most Route 50 riders can already access other services during the evening, the cost to bring service to the remaining riders would be relatively high.

#### Additional Sunday Service

As was shown in Figure 14-3, the largest gaps in Sunday service occur in Hyde Park between Washington Street and Hyde Park Avenue. In this area, weekday service is provided by Routes 33, 40, and 50, none of which operate on Sundays. The other SOUTHBus area without service is West Roxbury north of Centre Street and Brookline. Weekday service is provided in this area by Routes 38 and 51.

On weekdays and Saturdays, service to much of Hyde Park is provided by Routes 24 and 33. As discussed in Chapter 3, it is recommended that these two routes alternate trips from Ashmont through Mattapan and along Centre Street to Logan Square, where they would split apart to serve two different residential areas. However, on Sundays, ridership on the Centre Street trunk is much lower, and only Route 24 operates, leaving the area west of Hyde Park Avenue unserved. Without Route 40, which also does not operate on Sundays, Georgetowne is also without the service that Route 33 could indirectly provide.

To bring some service to this area, either Route 33 or extended Route 40 service could be operated on Sundays. Route 33 service would indirectly serve Georgetowne as discussed above for evening service. Route 40, if extended to Centre Street as recommended in Chapter 12, could serve both its own service area and the outer end of most of Route 33's service area. Of the

two alternatives, Route 33 would provide service to Ashmont, while Route 40 would provide service to Forest Hills. Route 40 would also provide slightly better service coverage by directly serving Georgetowne. The cost and service impacts of the two services would be comparable: Route 33 would operate at 65 minute headways to and from Ashmont, while an extended Route 40 would operate at 60 minute headways. With service between roughly 10:00 am and 6:00 pm, nine round trips would be operated on Route 33 and 10 would be operated on Route 40. This would translate into operating costs of \$23,600 per year on Route 33 and \$22,200 per year on Route 40 (assuming 59 Sunday schedule days).

On Route 50, the third route that operates in Hyde Park on weekdays, Sunday ridership would be difficult for the same reason as during the evening: most of the route's riders are also served by Routes 32 or 34, so that the additional ridership would be costly to serve.

In West Roxbury, most of the area served by Route 38 is already served by Routes 35 and 36, as is the case during the evening. As with evenings, riders along the outer end of Route 38 are within 15 minute walking distance of other service on Centre Street, so that Sunday service should not be needed. On Route 51, nearly all of the area served by that route is without any service. However, productivity of evening and Saturday service is very low (lower than on any of the route with Sunday service, except Routes 24 and 27), indicating that the productivity of Sunday service would also be very low. Therefore, the institution of Sunday service on this route should be based more on policy considerations than demand. The cost of ten Sunday round trips (between approximately 10:00 am and 6:00 pm) would be \$26,500.

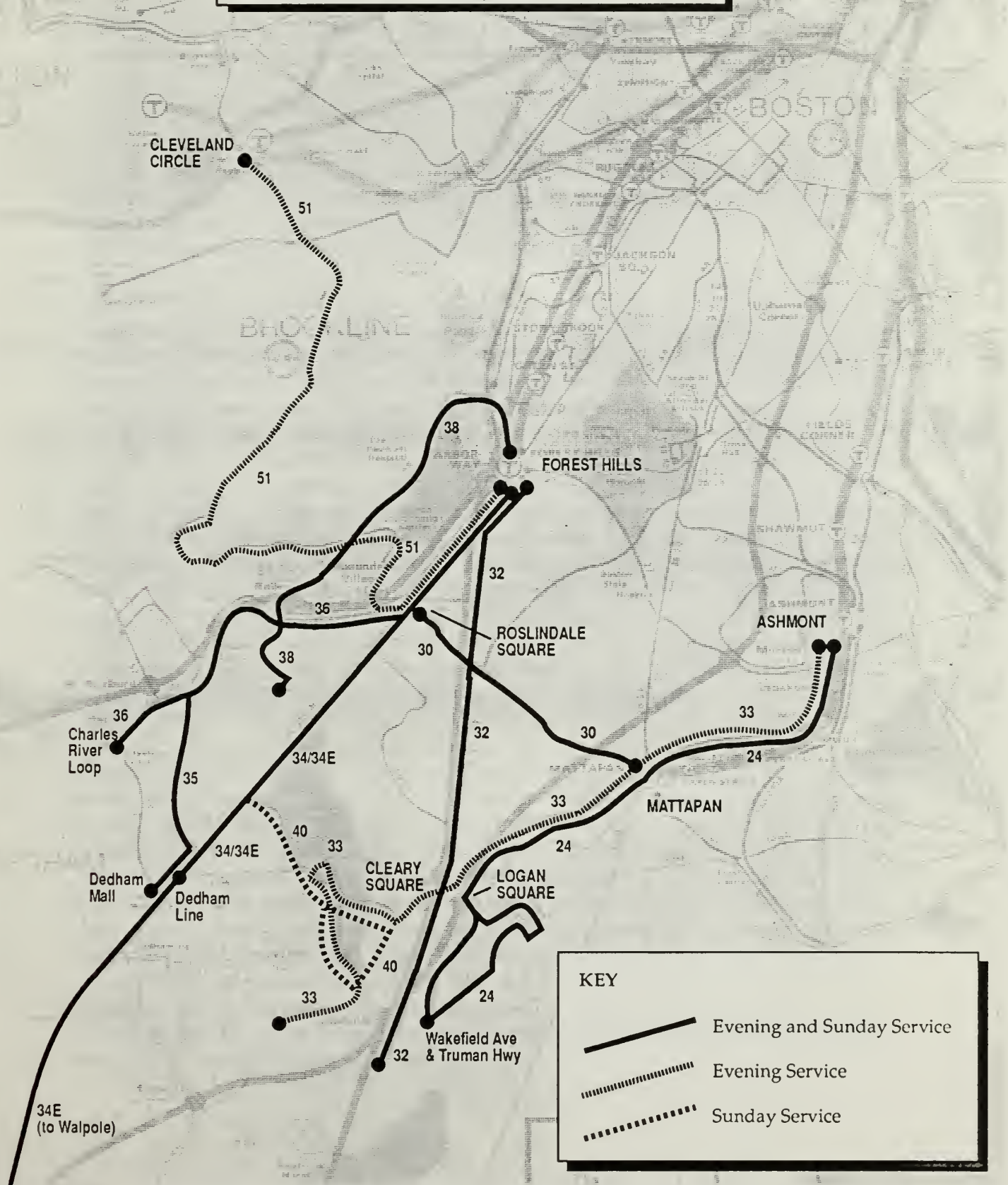
### Summary

During the evening, it is possible to significantly expand service coverage without additional expense by shifting some service from Route 24 to Route 33, and from Route 36 to Route 35. On Sundays, since service levels are already so low, it is not possible to shift service from one route to another to expand service coverage. Therefore, expanded service coverage would require new service at additional cost. The largest increase in service coverage for the cost would be Sunday service on Route 33 or an extended Route 40, either of which could serve much of the area of both routes. Route 40 may be the more attractive of the two due to slightly shorter headways, slightly lower cost, service to Forest Hills instead of Ashmont, and higher Saturday ridership, indicating that ridership on Sundays would also be higher. Additional service on other routes (Routes 38, 50 and 51), based on evening and Saturday performance or the duplication of service that would result, would be relatively expensive and should be considered for policy reasons only.



Assuming new evening service on Routes 33 and 35, and new service on Route 40 on Sundays, evening and Sundays bus coverage in the SOUTHBus area would be as shown in Figure 14-4 on the following page.

**Figure 14-4**  
**Recommended Evening and Sunday Service**







---

## 15. Summary/Recommendations

---

In general, the SOUTHBus corridor is an old, well-established area with established travel patterns. Bus service in the area is fairly well used, with most peak period, peak direction trips at or near seated capacity. However, very little service can be characterized as overcrowded.

Most of the work trips originating in the corridor are to downtown Boston, and the Fenway/Parker Hill area. In addition, there is a significant amount of travel within the corridor between Jamaica Plain and Hyde Park, Roslindale and West Roxbury, West Roxbury and Roslindale, and Hyde Park and South Dorchester. There is little "circumferential" or crosstown work trip travel within or through the area.

The existing transit service in the SOUTHBus area generally reflects these travel patterns. Most service is radial and focuses on downtown Boston. Each of the suburban communities is served by commuter rail, except Brookline, which is served by the Green Line. The Boston neighborhoods have commuter rail, rapid transit, and/or feeder bus service – the SOUTHBus routes – to the rapid transit system. SOUTHBus routes also provide all of the local transit service in the corridor. In addition, by providing access to the rapid transit system and to major bus terminals at Forest Hills, Mattapan, and Ashmont, SOUTHBus routes provide good connections to the rest of the Boston area.

Transit usage in the SOUTHBus area has increased as a result of the opening of the new Orange Line in May 1987 and the re-institution of commuter rail service on the Needham Line in October 1987. As of the Fall of 1987, MBTA pointchecks indicated that total ridership on routes connecting to the Orange Line had increased 17 percent, or 4,075 trips per day. Through February 1988, ridership to and from West Roxbury and Roslindale on the Needham Line was approximately 2,410 one-way trips per day. Although the re-institution of commuter rail service from West Roxbury and Roslindale would be expected to have drawn riders away from feeder bus service and the Orange Line, ridership on feeder bus routes has increased as well. On Routes 35, 36, 37 and 38, all of which serve West Roxbury, increases have actually exceeded those on other routes, at between 15 and 30 percent.

As is the nature of feeder bus service such as the SOUTHBus routes, most trips involve at least one transfer. However, most trips on SOUTHBus routes involve only one transfer, with less than five percent involving two or more transfers.<sup>58</sup> Most transfers take place with the rapid transit system; these occur primarily at Forest Hills, Ashmont and Mattapan, with some also taking place at Cleveland Circle or Reservoir on the Green Line. In total, 42 percent of all SOUTHBus trips involve a transfer of this type. In addition, 31 percent of all trips, or 7,650 weekday trips, involve transfers to other bus routes, mostly to routes operating beyond the SOUTHBus corridor.

Considering these existing travel and transfer patterns, the most attractive improvements from the perspective of existing riders and potential new riders would be those that improve service to downtown Boston and those that improve or eliminate transfers. In this respect, the Forest Hills station on the new Orange Line is a better connection point to the rapid transit system than Mattapan. Compared to the Mattapan High Speed Line and the Red Line, the Orange Line provides significantly faster service to downtown Boston and eliminates a transfer. In addition, the Orange Line serves the Back Bay and Park Square, while the Red Line does not.

### RECOMMENDED CHANGES

From Hyde Park and Mattapan, service could be improved by providing more direct service to the Orange Line at Forest Hills and/or direct service to the Red Line at Ashmont, eliminating the need to transfer with the Mattapan High Speed Line. The most cost-effective ways to accomplish this would be as follows:

- Provide better connections to Forest Hills by extending Route 30 from Roslindale Square to Forest Hills, and by extending the outer end of Route 40 past Georgetowne to Centre Street in the vicinity of Readville.
- Provide direct connections to the Red Line at Ashmont by extending both Route 24 and Route 33 from Mattapan to Ashmont throughout the day. (Extended service on these routes would replace Route 27 service.)

As further discussed below, each of these improvements, with the exception of the Route 30 extension, could be implemented without increasing costs by reallocating existing resources.

Service between West Roxbury and Roslindale, and from the two areas to downtown Boston could be improved by better coordinating existing services,

---

<sup>58</sup>Not including transfers within the rapid transit system, e.g., Red Line to Green Line.

extending the outer end of Route 38 to provide additional coverage, and providing evening service on Route 35. A number of alternatives were also examined to provide better crosstown service in West Roxbury. While most would be feasible, not enough new riders would be attracted to offset the inconvenience these changes would cause existing riders.

In addition, a large number of other service changes were examined that could increase ridership, the cost-effectiveness of the route, or both. All of the changes that could be implemented consistent with MBTA standards or policies are summarized in Table 15-1. In general, most that would increase ridership would also increase costs, and most that would improve efficiency would result in some ridership losses. However, many would be beneficial in both areas. This study's recommendations include improvements of this type, and those that attempt to balance the often competing goals of containing costs and increasing ridership. In total, these changes would increase ridership by 560 trips per day, while decreasing operating costs by \$274,000 per year. In addition, they should also provide significant service improvements to existing riders in terms of more direct service, fewer transfers, more reliable service, and more consistent headways.

The recommendations are listed below. They are summarized in tabular form in Table 15-2 (pages 246-248), and a map of the resulting route structure is shown in Figure 15-3 (page 249).

Route 24 (Wakefield Avenue/Truman Highway - Mattapan),  
Route 27 (Mattapan - Ashmont), &  
Route 33 (Dedham Line - Mattapan)

- Extend Routes 24 and 33 from Mattapan to Ashmont. Replace Route 27 with the extended Route 24 and Route 33 service.
- Operate evening service on Route 33 until approximately 11:30 pm.
- Interline all Route 24 and 33 trips and coordinate service on the trunk between Ashmont and Logan Square. Operate service on each route at headways of 30 minutes in the AM peak, school and PM peak periods, 45 minutes in the base period, and 60 minutes during the evening, providing trunk headways of 15 minutes in the AM peak, school and PM peak periods, 22.5 minutes in the base period and 30 minutes in the evening.
- Relocate Route 24's outer end layover point to the intersection of Fairmount Avenue and Beacon Street before 11:00 AM.
- Operate all Route 33.6 trips as Route 33.5 trips.



Table 15-1  
Summary of Changes Examined in South Corridor Bus Service Study

Ridership Impact	Impact on Pax Wait Time (hrs)*	Change in VSHs Provided	Annual Impact of Weekday Changes					Net Cost/ New Pax	Net Savings/ Pax Lost	Δ Pax Wait Time/Δ VSHs Operated	Impact on AM Peak Vehicle Reqmt
			Impact on Oper Costs	Impact on Fare Rev	Impact on Oper Deficit	Impact on					
<b>Routes 24, 27 &amp; 33 (Chapter 4)</b>											
•Extend Route 24 to Ashmont	70	-76.6	0.0	\$0	\$1,400	(\$1,400)	(\$0.08)	--	--	--	None
•Extend Route 33 to Ashmont	25	-44.2	0.0	\$0	(\$200)	\$200	\$0.03	--	--	--	None
•Extend Routes 24 & 33 to Ashmont	160	-102.0	0.0	\$0	\$6,000	(\$6,000)	(\$0.15)	--	--	--	None
•Route 24 to Forest Hills via Route 32; Route 33 to Ashmont	-430	116.6	-2.9	(\$27,800)	\$36,400	(\$64,200)	--	\$0.60	40.2	-1	None
•Route 33 to Forest Hills via Route 32; Route 24 to Ashmont	-290	40.7	-5.3	(\$45,300)	(\$26,500)	(\$18,800)	--	\$0.26	7.7	None	None
•Route 24 to Forest Hills via Route 50; Route 33 to Ashmont	-325	82.5	-2.9	(\$13,000)	(\$24,500)	\$11,500	--	(\$0.14)	28.4	-1	None
•Route 33 to Forest Hills via Route 50; Route 24 to Ashmont	-155	4.3	-5.3	(\$55,000)	(\$11,900)	(\$43,100)	--	\$1.11	0.8	None	None
•Relocate Route 24's outer end layover point before 11:00 am	0	0.0	0.0	\$0	\$0	\$0	--	--	--	None	None
•Operate all Route 33.6 trips as Route 33.5	0	0.0	0.0	\$0	\$0	\$0	--	--	--	None	None
•Route 24 - Revise headways											
40 min. headways:											
AM Peak	-145	66.9	-3.0	(\$27,500)	(\$10,900)	(\$16,600)	--	\$0.46	22.3	-1	None
Base	30	-23.0	0.0	\$0	\$2,100	(\$2,100)	(\$0.28)	--	--	None	None
School	-65	24.3	2.0	(\$15,200)	(\$4,875)	(\$10,325)	--	\$0.64	(12.2)	None	None
PM Peak	-60	21.6	-1.4	(\$15,200)	(\$4,500)	(\$10,700)	--	\$0.71	15.4	None	None
20 min. headways:											
School	25	-11.1	0.0	\$0	\$1,900	(\$1,900)	(\$0.30)	--	--	None	None
PM Peak	25	-11.1	0.0	\$0	\$1,900	(\$1,900)	(\$0.30)	--	--	None	None
•Route 33 – Revise headways											
25 min. headways:											
AM Peak	5	-3.0	-0.5	(\$7,300)	\$400	(\$7,700)	(\$6.16)	--	--	None	None
School	25	-15.1	0.0	\$0	\$1,900	(\$1,900)	(\$0.30)	--	--	None	None
PM Peak	10	-7.9	0.0	\$0	\$800	(\$800)	(\$0.32)	--	--	None	None
45 min Base headways	50	-33.4	0.0	\$0	\$3,800	(\$3,800)	(\$0.30)	--	--	None	None

**Table 15-1 (cont.)**  
**Summary of Changes Examined in South Corridor Bus Service Study**

	Ridership Impact	Impact on		Change in VSHs Provided	Annual Impact of Weekday Changes				Net Cost/ New Pax	Net Savings/ Pax Lost	Δ Pax Wait Time/Δ VSHs Operated	Impact on AM Peak Vehicle Reqmt
		Pax Wait Time (hrs)*	Fare		Impact on Oper Costs	Impact on Rev	Impact on Deficit					
<b>Route 30 (Chapter 5)</b>												
•Extend Route 30 to Forest Hills	55	145.0	15.7	\$127,700	(\$900)	\$128,600	\$9.35	--	--	1		
•40 min. headways:												
AM Peak	-145	65.5	-2.8	\$22,100	(\$13,200)	\$35,300	--	(\$0.97)	23.4	-1		
Base	-65	29.0	-2.2	\$26,600	(\$5,900)	\$32,500	--	(\$2.00)	13.2	None		
School	-95	44.8	-2.0	\$16,700	(\$8,600)	\$25,300	--	(\$1.07)	22.4	None		
PM Peak	-95	43.7	-2.0	\$16,700	(\$8,600)	\$25,300	--	(\$1.07)	21.9	None		
<b>Route 32 (Chapter 6)</b>												
•Extend to Brigham Circle:												
All Route 32 trips	230	-29.2	54.0	\$497,300	(\$54,600)	\$551,900	\$9.60	--	0.5	4		
Route 32.0 trips only	105	-12.2	14.0	\$105,900	(\$33,300)	\$139,200	\$5.30	--	0.9	2		
Half Route 32.0 trips	80	-9.8	7.0	\$50,600	(\$14,200)	\$64,800	\$3.24	--	1.4	1		
•Revise Route 32.0 headways:												
12 min. AM Peak headways	-55	11.9	-2.7	(\$18,300)	(\$5,000)	(\$13,300)	--	\$0.97	4.4	-1		
12 min. PM Peak headways	30	-7.4	0.0	\$0	\$2,800	(\$2,800)	(\$0.37)	--	--	None		
•Revise Route 32.1 headways:												
22 min. Early AM headways	-5	2.4	0.0	\$0	(\$500)	\$500	--	(\$0.40)	--	None		
13 min. School headways	65	-17.4	2.3	\$16,400	\$5,900	\$10,500	\$0.65	--	7.7	None		
18 min. School headways	-165	40.5	0.0	\$0	(\$14,800)	\$14,800	--	(\$0.36)	--	None		
12 min. PM Peak headways	85	-22.5	0.0	\$0	\$7,500	(\$7,500)	(\$0.35)	--	--	None		
20 min. Evening headways	90	-41.5	0.0	\$0	\$8,000	(\$8,000)	(\$0.36)	--	--	None		
<b>Route 34 (Chapter 7)</b>												
•Operate Variations 34.3 and 34.5 as Variation 34.4:												
Early AM	5	-0.9	0.0	\$0	\$600	(\$600)	(\$0.48)	--	--	None		
AM Peak	55	-16.0	0.0	\$0	\$6,500	(\$6,500)	(\$0.47)	--	--	None		
PM Peak	65	-7.5	0.0	\$0	\$7,600	(\$7,600)	(\$0.47)	--	--	None		
•Replace Route 34.5 PM Peak trips with Route 34.7 trips	105	-15.4	0.7	\$3,500	\$12,300	(\$8,800)	(\$0.34)	--	22.0	None		

**Table 15-1 (cont.)**  
**Summary of Changes Examined in South Corridor Bus Service Study**

Ridership Impact	Impact on Pax Wait Time (hrs)*	Change in VSHs Provided	Annual Impact of Weekday Changes			Net Cost/ New Pax	Net Savings/ Pax Lost	Δ Pax Wait Time/Δ VSHs Operated	Impact on AM Peak Vehicle Reqmt
			Impact on Oper Costs	Impact on Fare Rev	Impact on Oper Deficit				
Route 34 (cont.) (Chapter 7)									
•Extend Route 34.0 trips to the Dedham Mall:									
45 PM Peak	-14.7	0.0	\$2,500	\$5,300	(\$2,800)	(\$0.25)	--	--	None
345 All Day	-126.0	0.0	\$2,300	\$40,400	(\$38,100)	(\$0.44)	--	--	None
•Eliminate Walpole Center Service									
-285	NA	-12.0	(\$120,200)	(\$33,500)	(\$86,700)	--	\$1.22	0.0	-1
•Reduce Route 34.0 cycle times/modify headways:									
--Early AM: Reduce cycle time from 40 to 39 min.;									
20 min. headways	-5	1.0	\$7,000	(\$600)	\$7,600	--	(\$6.08)	0.5	None
--AM Peak: Reduce cycle time from 54 to 40 min.;	30	-10.7	1.4 (\$32,400)	\$3,500	(\$35,900)	(\$4.79)	--	7.6	-1
8 min. headway									
--School: Reduce cycle time from 56 to 46 min.;	10	-2.4	1.2 (\$4,400)	\$1,200	(\$5,600)	(\$2.24)	--	2.0	None
12 minute headway									
-- PM Peak: Reduce headway from 8 to 7 min.	5	-1.0	2.0 \$12,300	\$600	\$11,700	\$9.36	--	0.5	None
--Evening: Increase headway from 48 to 62 min.	-20	9.8	-3.2 (\$67,300)	(\$2,400)	(\$64,900)	--	\$12.98	3.1	None
•Reduce AM Peak long trip cycle times from 108 to 92 min.	0	0.0	2.8 (\$13,600)	\$0	(\$13,600)	--	--	0.0	-1
Routes 35 & 36 (Chapter 9)									
•Replace 1/2 of Route 36 late evening service w/Route 35									
20	7.3	0.0	\$0	\$1,900	(\$1,900)	(\$0.38)	--	--	None
•Coordinate Routes 35 & 36 with slightly lower service levels									
10	10.0	-4.7	(\$56,300)	\$900	(\$57,200)	(\$22.88)	--	2.1	None
10	-4.4	0.0	\$0	\$900	(\$900)	(\$0.36)	--	--	None
•Increase service to VA Hospital									
-230	60.1	-6.1	(\$19,100)	\$20,100	(\$39,200)	--	\$0.68	--	-2
-360	131.0	-11.0	(\$73,300)	\$31,500	(\$104,800)	--	\$1.16	11.9	None



Routes 38 & 51 (Chapter 11)

**Table 15-1 (cont.)**  
**Summary of Changes Examined in South Corridor Bus Service Study**

Ridership Impact	Impact on Pax Wait Time (hrs)*	Change in VSHs Provided	Annual Impact of Weekday Changes					Net Cost/ New Pax	Net Savings/ Pax Lost	Δ Pax Wait Time/Δ VSHs Operated	Impact on AM Peak Vehicle Reqmt
			Impact on			Impact on Oper Deficit					
			Oper Costs	Fare Rev	Oper						
Route 40 (Chapter 12)											
•Extend Route 40 to River St.	85	21.7	0.0	\$0	\$6,375	(\$6,375)	(\$0.30)	--	--	--	None
•Longer Route 40 headways:											
50 min. AM Peak headways	-40	21.4	-2.1	(\$19,400)	(\$3,000)	(\$16,400)	--	\$1.64	10.2	-1	None
45 min. Base headways	-55	29.0	-4.9	(\$30,000)	(\$4,200)	(\$25,800)	--	\$1.88	5.9	None	None
50 min. School headways	-25	13.2	-2.1	(\$19,400)	(\$1,900)	(\$17,500)	--	\$2.80	6.3	None	None
50 min. PM Peak headways	-25	14.8	-2.1	(\$19,400)	(\$1,900)	(\$17,500)	--	\$2.80	7.0	None	None
50 min. Evening headways	-5	2.4	-1.0	(\$11,600)	(\$400)	(\$11,200)	--	\$8.96	2.4	None	None
•Longer Route 40 headways with extension:											
60 min. Base headways	-70	45.1	-6.4	(\$35,700)	(\$5,300)	(\$30,400)	--	\$1.74	7.0	None	None
60 min. School headways	-25	17.1	-2.4	(\$19,900)	(\$1,900)	(\$18,000)	--	\$2.88	7.1	None	None
Route 50 (Chapter 13)											
•110 min. Base headways	-315	315.0	-6.5	(\$22,100)	(\$26,800)	\$4,700	--	(\$0.06)	48.5	None	None
•23 min. School headways	-25	8.8	-1.5	(\$18,800)	(\$2,000)	(\$16,800)	--	\$2.69	5.9	None	None
•28 min. School headways	-55	21.3	-3.3	(\$37,600)	(\$4,600)	(\$33,000)	--	\$2.40	6.5	None	None
•30 min. School headways	-65	25.9	-3.5	(\$38,000)	(\$5,400)	(\$32,600)	--	\$2.01	7.4	None	None
•22 min. PM Peak headways	-60	22.9	-1.3	(\$15,200)	(\$5,300)	(\$9,900)	--	\$0.66	17.6	None	None

\* In cases where transfers would be eliminated, passenger wait time savings include actual time savings plus five minutes for elimination of the transfer.

† Based on the adverse overall ridership impacts and/or the large number of new transfers that would be imposed, subsequent analysis was not conducted to determine passenger wait time, vehicle service hour and cost impacts.

By extending Routes 24 and 33 to Ashmont, direct service would be provided to the Red Line at Ashmont, eliminating the transfer with the Mattapan High Speed Line for 670 daily riders. These extensions would allow Route 27 to be eliminated, and if service on the two routes were interlined, the extensions could be implemented without any additional vehicles and without increasing operating costs. Further, due to the elimination of the Mattapan transfer and shorter headways that would be provided between Mattapan and Ashmont, overall ridership should increase by 160 trips per day (six percent), increasing fare revenue by \$6,000 per year.

With or without extended service to Ashmont, service on Routes 24 and 33 should be coordinated along the trunk. At this time, there is no coordination, and peak period headways on the trunk vary from zero to 20 minutes. Since the cycle times and loading characteristics of the two routes are similar, service should be scheduled so that the two routes alternate trips along the trunk in both directions. If implemented as discussed in Chapter 4, coordination of the two routes would not have any operating cost impact, nor would it increase vehicle requirements.

At the outer end of Route 24, travel times could be reduced for 75 existing riders by moving the outer end layover point before 11:00 am. Since the outer-end is a loop and the layover point is near the end of the loop, inbound riders boarding at the beginning of the loop must board an "outbound" trip and then layover with the bus until the beginning of the inbound trip. By moving the layover point to the beginning of the loop at the intersection of Fairmount Avenue and Beacon Street during the period when most loop ridership is in the inbound direction, the layover would be eliminated for those riders. This change would not have any operating cost or vehicle impact.

On Route 33, variations 33.5 and 33.6 travel around a loop along the middle of the route in different directions. Before 2:00 pm, service operates around the loop only in a clockwise direction (as Route 33.5), and after that time, only in a counter-clockwise direction (as Route 33.6). Since no passenger trips are made completely within the loop, no one is left unserved as a result, but it means that riders board on one side of the street during part of the day and on the other side of the street during the rest of the day. This is confusing to occasional riders and does not provide any operational benefits. The two variations also vary at the outer end of the route. These differences also do not appear to be justified by demand. Of the two variations, Route 33.5 appears to provide the most direct and responsive service. Therefore, since the differences that the two variations provide are not



useful, all Route 33.6 trips should be operated as Route 33.5 trips. This change would also have no operating cost or vehicle impact.

#### Route 30 (Roslindale Square - Mattapan)

- Extend Route 30 from Roslindale Square to Forest Hills.
- Operate extended Route 30 at headways of 20 minutes during peak periods, 30 minutes during the mid-day, and 50 minutes in the evening.

As mentioned above, Forest Hills is a more attractive transfer point than Mattapan for trips to downtown Boston, due to shorter travel times and the elimination of at least one transfer. For Route 30 riders, total travel time savings resulting from direct connections with Forest Hills would be large: 12 to 18 minutes to the Financial District and Government Center, and 24 to 27 minutes to the Back Bay and Park Square. For Financial District/Government Center riders, one transfer would be eliminated (with the Mattapan High Speed Line), and for Back Bay/Park Square riders, two transfers would be eliminated (one with the Mattapan High Speed Line and one with the Green Line or Orange Line in downtown Boston).

Up to 400 existing Route 30 riders would benefit from the extension. Including a time value for transfers of five minutes, an extension would save these riders 145 hours per day. At the service level described, which is essentially the same as is now provided, the extension would cost \$127,700 per year and require one additional vehicle during peak periods.

#### Route 32 (Wolcott Square/Cleary Square - Forest Hills)

- Reduce cycle times on variation 32.0 from 42 to 36 minutes throughout the day. Use the lower cycle time to reduce AM peak vehicle requirements by one vehicle and to reduce PM peak headways from 14 to 12 minutes.
- Reduce the PM peak cycle time on variation 32.1 from 56 to 48 minutes. Use the lower cycle time to reduce PM peak headways from 14 to 12 minutes.
- Increase the school period cycle time on variation 32.1 from 42 to 52 minutes. Add one vehicle, reducing headways from 15 to 13 minutes to reduce crowding.

- Reduce the evening cycle time on variation 32.1 from 60 to 40 minutes. Use the lower cycle time to reduce evening headways from 30 to 20 minutes.
- Adjust booktimes within existing or proposed cycle times on both variations during the AM peak to reflect current operating conditions.

Existing cycle times are longer than necessary during many periods on both variations and can be reduced. The lower cycle times will then allow either fewer vehicles to be deployed, or a higher level of service to be provided. During the AM peak, one vehicle could be saved, and operating costs reduced by \$13,300 per year. During the PM peak and evening periods, the cycle time changes are not large enough to save a vehicle, so headways should be reduced. These headway reductions should increase ridership by 120 trips per day without increasing the number of vehicle hours provided.

During the school period, an increase in the cycle time is needed to improve reliability. Also, with existing headways, there is crowding on Route 32.1 trips. With the cycle time increase, it would be necessary to add one vehicle to avoid more severe crowding. The net operating cost of this additional service would be \$10,500 per year. During the early AM and base periods, cycle time changes are not needed, but one-way running time adjustments within the existing cycle times would improve reliability.

#### Route 34 (Walpole/Dedham Line - Forest Hills)

- Increase service north of LaGrange Street by replacing limited service (Routes 34.3 and 34.5) with non-limited service (34.4).
- Schedule variations to prevent crowding on long trips.
- Add one 34.0 trip inbound prior to the 5:45 am inbound East Walpole trip.
- Reschedule 34.0 trips at even 15-minute intervals during the school period, to allow 34.8 trips to follow 34.0 trips at a small interval.
- Renumber redundant trips to reduce route variations.
- Eliminate Walpole Center service.
- Increase service to the Dedham Mall.

- Reduce 34.0 cycle times throughout the day. Use the reduced cycle times to reduce vehicle requirements by one during the AM peak, school, and evening periods.
- Reduce the AM peak long-trip cycle time from 108 to 92 minutes to reduce vehicle requirements by one.
- Provide park and ride service in the Route 128/Washington Street area.
- Reduce evening service from 48 to 62 minute headways.

Route 34 is a long route with nine different variations. Thus, scheduling and operating the route is complicated. One measure that can be taken to simplify the route without any service or ridership impacts is to eliminate redundant variations. Variations 34.3 and 34.5 provide local service between Walpole Center and the Dedham line and limited service in the peak direction during the AM and PM peaks. Thus, both variations could use the same number. In the evening, variation 34.3 operates outbound via the Dedham Mall, and could be scheduled as variation 34.7. Variation 34.9 is always through-routed with a 34.0 trip, thus operating between East Walpole and Forest Hills in the same manner as 34.6. Additionally, because "limited" service usually stops at most stops, variations 34.3 and 34.5 should be changed to local operation and renumbered as variation 34.4 trips.

Crowding on Route 34 occurs on the northern segment of the line, where Route 34.0 operates. Four of the recommendations listed above are aimed at reducing this crowding. Replacement of limited service with local service will increase service frequency on this portion of the route and can be implemented at minimal cost because local trips can be scheduled within existing limited trip cycle times. This change, in addition to relieving crowding, could attract up to 125 new passengers. Additional measures to reduce crowding include addition of a 34.0 trip inbound to precede the 5:45 am inbound East Walpole trip, scheduling alternative variations to prevent crowding on the long trips, and rescheduling school period trips to allow long (34.8) trips to follow short (34.0) trips. All three of these measures aim at preceding long trips with short trips to reduce the number of passengers boarding the long trips north of the Dedham line.

Prior to the Fall of 1987, Route 34 service terminated at East Walpole. However, service was extended in 1987 to provide service into Walpole and to the Walpole Center commuter rail station. However, ridechecks conducted during the Fall of 1988 (one full year after the service was extended) show limited ridership on this segment of the



route. In fact, only 140 daily boardings and 145 daily alightings were observed on this portion of the route, for an average of 23 passengers per hour. Elimination of the Walpole Center extension would save over \$120,000 annually.

Additional increases in productivity could be attained by increasing service to the Dedham Mall. The mall is already a major trip generator along the route, with close to 1,300 passengers boarding or alighting annually. Most of the riders who use the mall stop are transit-dependent, and most service is only provided at 30 minute headways. Also, only one trip is provided outbound via the mall during the PM peak. Service to the mall could be increased at no cost by adding a stop on Washington Street at the entrance to the mall on variation 34.5 trips, or at minimal cost by either replacing variation 34.5 with 34.7 to both increase service to the mall and increase service north of LaGrange Street or by extending variation 34.0 trips to the mall. Extension of Route 34.0 service to the mall would provide the largest benefit to the greatest number of passengers (344 new passengers and 126 hours less passenger wait time), at a cost of only \$2,500 per year.

Cycle times are longer than necessary during many periods on Route 34.0 and on the Walpole variations during the AM peak. Cycle times can be reduced to allow fewer vehicles to be deployed or a higher level of service to be provided. During the AM peak, two vehicles could be saved, and operating costs reduced by \$46,000 per year. During the school and evening periods, one vehicle could be saved and operating costs could be reduced by \$71,700 per year. Finally, evening service could be reduced within revised cycle times to 62 minute headways for cost savings of \$67,300 per year, with a loss of only 20 passengers and an increase in wait time of 3.1 hours for the remaining passengers.

The service area of Route 34 could be effectively expanded by the provision of a park-and-ride lot in the Route 128/Washington Street area. This lot could attract current auto commuters from beyond the SOUTHBus service area. The lot, which could be located at the Dedham Mall (contingent upon agreement with the mall owner), would attract commuters from congested Route 128. While the ridership impact of this recommendation has not been fully assessed, it could be tested as a no-cost (or low-cost) improvement, depending upon agreement from the mall owner.

Route 35 (Dedham Mall/Dedham Line - Forest Hills),  
Route 36 (Charles River Loop - Forest Hills), &  
Route 37 (Baker/Vermont Streets - Forest Hills)

- Coordinate Route 35, 36, and 37 service between West Roxbury's Centre Street business district and Forest Hills from the beginning of service until the end of the PM peak.
- Shift half of Route 36's evening service to Route 35 to provide evening service on Route 35, and coordinate evening service on the two routes.
- Operate Routes 35, 36, and 37 at 15 minute AM peak headways, 30 minute base period headways, 20 minute school period headways, and 18 minute PM peak period headways; operate Routes 35 and 36 at 60 minute evening headways.
- Operate all Route 36 trips to the VA Hospital.
- Increase Route 36.8 inbound running times and provide more layover time at Forest Hills, to solve reliability problems.

Routes 35, 36, and 37 serve the same alignment between the Centre Street business district and Forest Hills, and most ridership on each route is within that segment. At present, service on the three routes is not coordinated, and irregular headways are provided. Loads on the outer ends of the routes are similar, and only relatively minor cycle time changes are necessary to coordinate the three routes.<sup>59</sup> Coordinated service on the three routes would provide a high level of service between Forest Hills, Roslindale Square, and West Roxbury throughout the day, with trunk headways at one-third of those listed above for each route individually. Overall, coordination of the three routes should increase ridership by about 20 trips per day, in spite of slightly lower overall service levels, and reduce operating costs by \$16,300 per year.

After 9:00 pm, 30 minute headways are operated on Route 36 while no service is operated on Route 35. The 30 minute headways are needed on the trunk segment of the route between Forest Hills and the Centre Street business district, but not along the outer end. Therefore, excess service could be shifted from Route 36 to Route 35, to improve evening service coverage, while maintaining 30 minute trunk headways. This no-cost measure should also increase ridership by 20 trips per day.

---

<sup>59</sup>With the exception of Route 37 in the AM peak - see Chapter 10.

With coordinated service, there would be enough slack time in Route 36's cycle time to operate all Route 36 trips to the VA Hospital as variation 36.8. This, plus the operation of evening service on Route 35, would make the VA Hospital transit-accessible to evening visitors and to workers on all three shifts at no additional cost to the MBTA. Ridership increases would likely be small, possibly only 10 new trips per day, but again, there would be no additional cost to provide the service.

Throughout the day, inbound running times and layover times at Forest Hills need to be increased on Route 36.8. At present, actual inbound running times exceed book times by up to five minutes. This, coupled with a lack of adequate layover time at Forest Hills, encourages drivers to leave from the Charles River Loop early in order to arrive on time. This problem only occurs on inbound trips; on outbound trips there is excess time. Therefore, the additional time needed can be taken from outbound trips and layover time at the Charles River Loop. There is no need to increase cycle times, headways, or vehicle requirements.

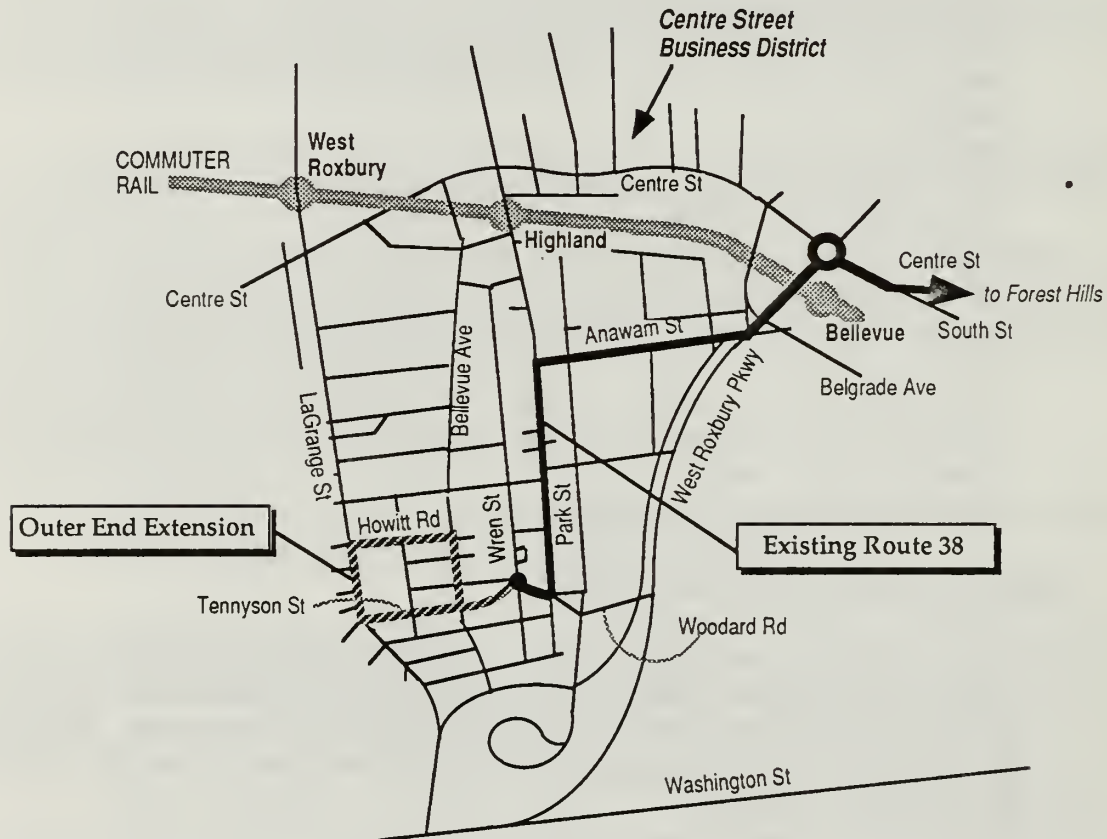
#### Route 38 (Wren Street - Forest Hills)

- Extend the outer end of Route 38 to LaGrange Street to improve service coverage (see Figure 15-1). Operate the extended service with the same number of vehicles as are presently deployed, by increasing headways from 22 to 25 minutes during peak periods and from 45 to 50 minutes during other periods.
- Shift the last evening round-trip from a 10:40 pm outbound departure to an 8:00 pm outbound departure, to eliminate gaps in service.
- Increase school and PM peak headways from 22 to 24 minutes to solve reliability problems.
- Adjust booktimes within existing cycle times during the AM peak, base and evening periods to reflect current operating conditions.

Route 38 is the only route that serves West Roxbury's Bellevue neighborhood. Existing service coverage is limited and could be improved by extending the outer end from Wren Street to LaGrange Street as shown in Figure 15-1. Since existing service is underutilized, extended service could be operated with the same number of vehicles by slightly increasing headways. Overall, the extension should attract 105 new trips, but longer headways would result in the loss of 70 existing trips; thus the net gain would be 35 trips per day.



Figure 15-1  
Route 38 Outer End Extension



During the evening, Route 38's current schedule is very irregular, with outbound headways ranging from 25 to 120 minutes. In the inbound direction, headways are as long as 128 minutes. (In the Winter 1989 schedule, outbound trips departed from Forest Hills at 6:40 pm, 7:20 pm, 8:40 pm, and 10:40 pm; inbound trips depart at 6:35 pm, 7:01 pm, 7:44 pm, 9:05 pm, and 11:13 pm.) Ridership on all trips is fairly low, averaging four passengers inbound and 12 passengers outbound in the Spring of 1986.

The reason for the irregular schedule is unclear, and the irregularity is presumably inconvenient and confusing to riders. In the absence of a specific rationale for this schedule, more consistent headways should be provided. Considering the low ridership on existing trips, the most cost-effective way to provide regular headways would be to shift the last trip from 10:40 pm outbound to 8:00 pm outbound, with service ending after the 8:40 pm outbound round-trip. While this would reduce the span of service, it would also eliminate long gaps in early

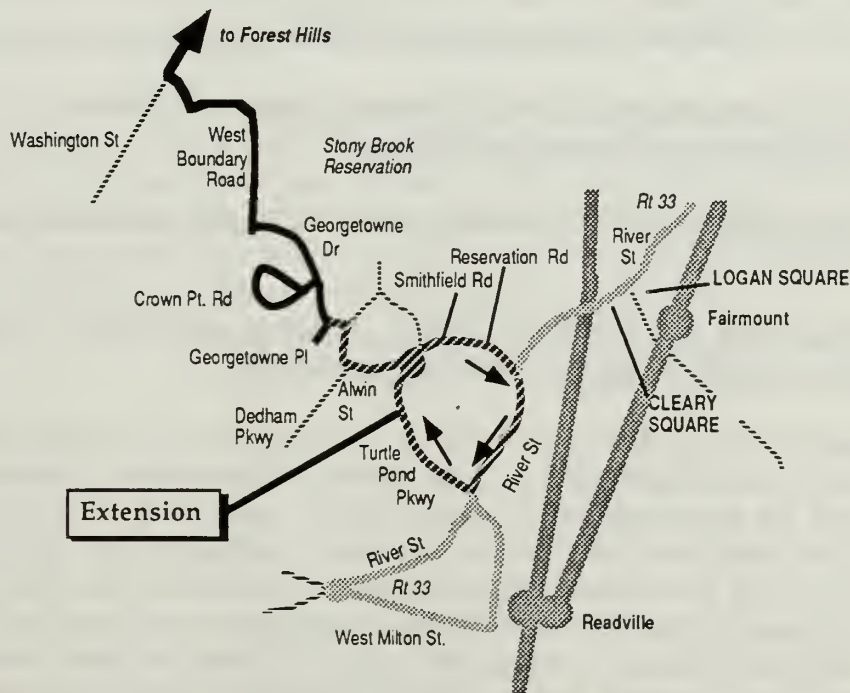
evening service, simplify the route, and present a more rational schedule to the public.

During the school and PM peak periods, service is now operated with a 44 minute cycle time. Running times exceed booktimes during these periods to the extent that a large number of late departures are occurring. To eliminate this problem without increasing costs, headways should be increased to 24 minutes, increasing the cycle time to 48 minutes. During other periods, cycle times remain adequate, but running time adjustments should be made within those cycle times to improve schedule adherence.

#### Route 40 (Georgetowne - Forest Hills)

- Extend the outer end of Route 40 to River Street to provide direct connections to the Orange Line at Forest Hills from more of Hyde Park (see Figure 15-2).

Figure 15-2  
Extension of Route 40 past Georgetowne



- During peak periods, operate the extended service with the same number of vehicles as are presently deployed, by increasing headways

from 25 to 30 minutes. During the mid-day, operate 60 minute headways to save one vehicle.

As discussed earlier, bus connections to Forest Hills can provide faster service to downtown Boston than connections through Mattapan. An extension of Route 40 to River Street could provide direct connections from an area of Hyde Park that now only has service to Mattapan. As with an extension of Route 38, an extension of Route 40 could also be accomplished within existing vehicle requirements by increasing headways slightly. Route 40 is currently underutilized throughout the day so that longer headways would not create crowding problems. Overall, including the impact of longer headways, the extension should increase ridership by 85 trips per day, or seven percent. Since the extended service would be operated with the same number of vehicles and with the same service span, there would be no significant impact on operating costs.

The segment of Route 40 beyond Washington Street is very lightly utilized during the base and school periods, with average loads of less than 11 passengers per trip. As a result, headways during these periods could be increased to save one vehicle without causing undue inconvenience to existing riders. Sixty minute headways, although they would result in a loss of 95 trips per day, would save 8.8 vehicle hours and reduce operating costs by \$55,600 per year.

**Route 50 (Cleary Square - Forest Hills via Clarendon Hills) &  
Route 51 (Cleveland Circle - Forest Hills)**

- Increase school period headways on Routes 50 and 51 from 20 to 30 minutes.
- Adjust Route 51 booktimes within existing cycle times during other periods to reflect current operating conditions.

Route 50 and Route 51 service is interlined throughout the day. During the school period, both operate with excess capacity. Service could be more efficiently provided by operating both routes at 30 minute headways to save two vehicles. Although this would result in a loss of 65 passengers, the passenger impacts would be relatively small compared to the vehicle savings - passenger wait time for remaining passengers would increase by only 7.4 hours for each vehicle hour saved and operating costs would be reduced by \$37,600 per year.



## OTHER ISSUES

### Additional Evening and Weekday Service

At the Boston Transportation Department's community transit workshops, SOUTHBus area residents expressed a desire for more evening and weekend service. During the evening, service coverage could be significantly expanded without additional expense by shifting service from Route 24 to Route 33, and from Route 36 to Route 35, as recommended above. On Sundays, service levels are so low that it would not be possible to shift service from one route to another to expand service coverage. Therefore, expanded service coverage would require new service at additional cost. The largest increase in service coverage for the cost would be Sunday service on Route 33 or an extended Route 40, either of which could serve much of the area of both routes. Route 40 may be the more attractive of the two, due to slightly shorter headways, slightly lower cost, service to Forest Hills instead of Ashmont, and higher Saturday ridership, indicating that ridership on Sundays would also be higher. The cost of additional service on other routes (Routes 38, 50, and 51), based on evening and Saturday performance or the duplication of service that would result, would be relatively high, and therefore, additional service should be considered for policy reasons only.

### Holding Buses at Forest Hills Until Trains Have Unloaded

Missed transfers that occur at Forest Hills when buses leave as trains are unloading could be avoided by installing beacons on the bus platforms that flash as trains arrive at the station; in the San Francisco Bay Area, trains entering stations trigger a sensor in the track that turns on a flashing beacon signaling bus drivers to hold until transfers have been made. A similar program for Forest Hills should be investigated.

**Table 15-2**  
**Summary of Recommendations**

Ridership Impact	Impact on Pax Wait Time (hrs)*	Change in VSHs Provided	Annual Impact of Weekday Changes				Net Cost/ New Pax	Net Savings/ Pax Lost	Δ Pax Wait Time/Δ VSHs Operated	Impact on AM Peak Vehicle Reqmt
			Impact on Oper Costs	Impact on Fare Rev	Impact on Oper Deficit	Impact on				
Routes 24, 27 & 33 (Chapter 4)										
•Extend Routes 24 & 33 to Ashmont and coordinate service	160	-102.0	0.0	\$0	\$6,000	(\$6,000)	(\$0.15)	--	--	None
•Relocate Route 24's outer end layover point before 11:00 AM	0	0.0	0.0	\$0	\$0	\$0	--	--	--	None
•Operate all Route 33.6 trips as Route 33.5	0	0.0	0.0	\$0	\$0	\$0	--	--	--	None
•Overall Impact	160	-102.0	0.0	\$0	\$6,000	(\$6,000)	(\$0.15)	--	--	None
Route 30 (Chapter 5)										
•Extend Route 30 to Forest Hills	55	145.0	15.7	\$127,700	(\$900)	\$128,600	\$9.35	--	--	1
•Overall Impact	55	145.0	15.7	\$127,700	(\$900)	\$128,600	\$9.35	--	--	1
Route 32 (Chapter 6)										
•Revise Route 32.0 headways: 12 min. AM Peak headways	-55	11.9	-2.7	(\$18,300)	(\$5,000)	(\$13,300)	--	\$0.97	4.4	-1
12 min. PM Peak headways	30	-7.4	0.0	\$0	\$2,800	(\$2,800)	(\$0.37)	--	--	None
•Revise Route 32.1 headways: 13 min. School headways	65	-17.4	2.3	\$16,400	\$5,900	\$10,500	\$0.65	--	7.7	None
20 min. Evening headways	90	-41.5	0.0	\$0	\$8,000	(\$8,000)	(\$0.36)	--	--	None
•Overall Impact	130	-54.4	-0.5	(\$1,900)	\$11,700	(\$13,600)	(\$0.42)	--	--	-1
Route 34 (Chapter 7)										
•Operate Variations 34.3 and 34.5 as Variation 34.4:										
Early AM	5	-0.9	0.0	\$0	\$600	(\$600)	(\$0.48)	--	--	None
AM Peak	55	-16.0	0.0	\$0	\$6,500	(\$6,500)	(\$0.47)	--	--	None
PM Peak	65	-7.5	0.0	\$0	\$7,600	(\$7,600)	(\$0.47)	--	--	None
•Extend Route 34.0 trips to the Dedham Mall:										
PM Peak	45	-14.7	0.0	\$2,500	\$5,300	(\$2,800)	(\$0.25)	--	--	None
All Day	345	-126.0	0.0	\$2,300	\$40,400	(\$38,100)	(\$0.44)	--	--	None

Table 15-2 (cont.)  
Summary of Recommendations

Ridership Impact	Impact on Pax Wait Time (hrs)*	Change in VSHs Provided	Annual Impact of Weekday Changes				Net Cost/ New Pax	Net Savings/ Pax Lost	Δ Pax Wait Time/Δ VSHs Operated	Impact on AM Peak Vehicle Reqmt
			Impact on Oper Costs	Impact on Fare Rev	Impact on Oper Deficit	Impact on				
<b>Route 34 (cont.) (Chapter 7)</b>										
•Eliminate Walpole Center Service	-285	NA	-12.0	(\$120,200)	(\$33,500)	(\$86,700)	--	\$1.22	0.0	-1
•Reduce Route 34.0 cycle times/modify headways: --AM Peak: Reduce cycle time from 54 to 40 min.; 8 min. headway	30	-10.7	1.4	(\$32,400)	\$3,500	(\$35,900)	(\$4.79)	--	7.6	-1
--School: Reduce cycle time from 56 to 46 min.; 12 minute headway	10	-2.4	1.2	(\$4,400)	\$1,200	(\$5,600)	(\$2.24)	--	2.0	None
--Evening: Increase hdway from 48 to 62 min.	-20	9.8	-3.2	(\$67,300)	(\$2,400)	(\$64,900)	--	\$12.98	3.1	None
•Reduce AM Peak long trip cycle times from 108 to 92 min.	0	0.0	2.8	(\$13,600)	\$0	(\$13,600)	--	--	0.0	None
•Overall Impact	250	-168.4	-9.9	(\$233,100)	\$29,200	(\$262,300)	(\$4.20)	--	--	-2
<b>Routes 35 &amp; 36 (Chapter 9)</b>										
•Replace 1/2 of Route 36 late evening service w/Route 35	20	7.3	0.0	\$0	\$1,900	(\$1,900)	(\$0.38)	--	--	None
•Coordinate Routes 35 & 36 with slightly lower service levels	10	10.0	-4.7	(\$56,300)	\$900	(\$57,200)	(\$22.88)	--	2.1	None
•Increase service to VA Hosp.	10	-4.4	0.0	\$0	\$900	(\$900)	(\$0.36)	--	--	None
•Overall Impact	40	12.9	-4.7	(\$56,300)	\$3,700	(\$60,000)	(\$6.00)	--	2.7	None
<b>Route 37 (Chapter 10)</b>										
•Coordinate with Routes 35 and 36	-20	-0.7	-2.5	(\$16,300)	(\$1,800)	(\$14,500)	--	\$2.90	--	None
•Overall Impact	-20	-0.7	-2.5	(\$16,300)	(\$1,800)	(\$14,500)	--	\$2.90	--	None



**Table 15-2 (cont.)  
Summary of Recommendations**

Ridership Impact	Impact on Pax Wait Time (hrs)(*)	Change in VSHs Provided	Annual Impact of Weekday Changes					Net Cost/ New Pax	Net Savings/ Pax Lost	Δ Pax Wait Time/Δ VSHs Operated	Impact on AM Peak Vehicle Reqmt
			Impact on Oper Costs	Impact on Fare Rev	Impact on Oper Deficit	Impact on New Pax					
<b>Route 38 (Chapter 11)</b>											
•Extend outer end of Route 38	35	34.1	0.0	\$0	\$2,800	(\$2,800)	(\$0.32)	--	--	--	None
•Increase School & PM Peak headways to 24 min. to improve reliability	-15	5.3	0.0	\$0	(\$1,200)	\$1,200	--	(\$0.32)	--	--	None
•Consistent Route 38 Evening headways: shift late trip	--	NA	0.0	\$0	\$0	\$0	--	--	--	--	None
•Overall Impact	20	5.3	0.0	\$0	\$1,600	(\$1,600)	(\$0.32)	--	--	--	None
<b>Route 40 (Chapter 12)</b>											
•Extend Route 40 to River St.	85	21.7	0.0	\$0	\$6,375	(\$6,375)	(\$0.30)	--	--	--	None
•Longer Route 40 headways with extension:	-70	45.1	-6.4	(\$35,700)	(\$5,300)	(\$30,400)	--	\$1.74	7.0	7.0	None
60 min. Base headways	-25	17.1	-2.4	(\$19,900)	(\$1,900)	(\$18,000)	--	\$2.88	7.1	7.1	None
60 min. School headways	-10	83.9	-8.8	(\$55,600)	(\$825)	(\$54,775)	--	\$21.91	9.5	9.5	None
•Overall Impact											
<b>Routes 50 and 51 (Chapters 11 and 13)</b>											
•30 min. School headways	-65	25.9	-3.5	(\$38,000)	(\$5,355)	(\$32,645)	--	\$2.01	7.4	7.4	None
•Overall Impact	-65	25.9	-3.5	(\$38,000)	(\$5,355)	(\$32,645)	--	\$2.01	7.4	7.4	None
<b>TOTAL IMPACTS</b>											
	560	-52.5	-14.1	(\$273,500)	\$43,320	(\$316,820)	(\$2.26)	--	--	--	-2

\* In cases where transfers would be eliminated, passenger wait time savings equal actual time savings plus five minutes for elimination of the transfer.

**Figure 15-3  
Recommended Route Structure**

